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VOL. I.

FROM MARCH, 1824, TO JANUARY, 1825.

CONDUCTED BY

THOMAS BELL, Esq. F.L.S.

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INTRODUCTION.

THE principal objects of the ZOOLOGICAL JOURNAL have already been stated in the Prospectus which preceded its publication, but it may be well to recapitulate them in this short introduction to our first number, which we have at length the honour of submitting to our subscribers. Some apology, however, may first be necessary for the delay which has taken place in its appearance. When we originally announced it for the first day of the present year, we were confident that it would be in our power to redeem our pledge, but circumstances occurred that compelled us, however unwillingly, to postpone the publication to the 1st of March.

It is not necessary to dwell on the utility of works of this nature, the store-houses as they may be called of the natural sciences, where a multitude of new and interesting facts are daily preserved, which might otherwise remain in the bosoms of their discoverers, or only be partially dispersed through small circles by the vague and often inaccurate method of oral communication. The usefulness of periodical journals is indeed amply attested by the numbers that weekly, monthly, and quarterly issue from the press; the want of a journal exclusively devoted to Zoology in all its branches,

by the fact that amongst all those just alluded to there is not one, at least in England, of this class.—*Pudet hæc opprobria nobis et dici potuisse*,—we will not finish the line—the *potuisse refelli* we hope will be found in the present work; and that it may be we look with confidence to our fellow countrymen and to learned foreigners for the benefit of their assistance in our arduous undertaking. Without such assistance indeed, neither ourselves nor, we think, any other set of men would be bold enough to enter on the task—for the undivided attention of many would be incompetent to it; and even were it otherwise, undivided attention is in the power of few—certainly not in that of either of the conductors of this journal. But it is time to particularize the objects of it, from which our friends and readers, and the scientific world at large, will understand the course we mean to pursue, and the nature of the aids we solicit from their liberality and patronage.

Original Memoirs and Monographs will take the precedence in our pages. The subjects of Zoological Classification—Comparative Anatomy—particular Classes, Families, Genera, and Species—Animal Chemistry—Palæontology and Nomenclature are amongst the most important. The first is obviously dependant on a sufficient knowledge of the structure of animal bodies, and the analogies that may be traced in this respect from the least to the most perfect, whence Comparative Anatomy, on which that knowledge depends, claims a very high rank in Zoological researches.

We particularly request our correspondents, foreign and domestic, to keep this subject constantly in view, convinced that no arrangement can be sound and stable, which is not founded on that important science. It has, at length, in great measure rescued one branch of natural history from the confusion and absurdity in which, whilst the structure of the habitation only and not that of the inhabitant was considered, its arrangements were involved. Conchology is

now taken from the insulated post it formerly occupied, and restored to its proper rank. The views of Adanson have been continued, extended and improved by a succession of labourers in this department of science, and the valuable facts they have established will hand down their names with honour to posterity.

Much confusion unfortunately still exists in another respect, not only in Zoology, but in every branch of natural history, and must continue till some better principles of Nomenclature shall, by general consent, be adopted in this and the sister sciences. Not only are many of the terms employed radically defective and at variance with all sound rules of grammar and etymology, and chosen, one would think, in some instances from the worst words of the worst writers, obsolete and cacophonous, but the student is perplexed by the intolerable multitude of unnecessary synonyms with which half the known subjects of these sciences are overwhelmed. Arbitrary changes are too often made in names long since fixed to particular objects by their original discoverers, with no apparent view, but to gratify a silly personal vanity; "that's villainous, and shows a pitiful ambition in the fool that uses it." The Zoological Journal will always be open to memoirs on this subject, and we are confident that incalculable benefit will accrue to the science of natural history in general, from dispassionate discussions on the true principles of Nomenclature.

Entire translations or abstracts (as their importance may require) of foreign papers, which either contain new matter, or are rendered interesting by the relation of remarkable facts, or the developement of new views connected with Zoology, will follow the original Memoirs and Monographs, and our readers will thus be regularly furnished with detailed accounts of the most important discoveries made in the science by their fellow labourers on the continents both of the Old and New World. The proceedings of learned

societies will succeed the translations, and facts of minor importance, but still of interest, will be given in the notices at the end of each number.

One subject remains to be mentioned, viz. the Analyses of New Publications. In executing this part of our duty, one sole principle will be our guide—strict impartiality and justice—no private friendships, no partial leanings shall induce us to praise a bad work, nor any invidious motives to withhold our commendations from a good one. We may err in our judgment, but it shall always be the result of a conscientious conviction of its truth.

Some of our readers may perhaps think that the subject of the paper which stands at the head of our first number is not strictly connected with the object of our journal. If there be any such, we trust they will nevertheless thank us for laying it before them, from the pleasure we are certain they must derive from its perusal. A most difficult subject is treated by Mr. French, we think, with singular skill and ingenuity; but even this consideration would not have induced us to give it to the public, had it not appeared to us to be strictly consistent with the plan of our work. Its object is to develop the operations of mind, if we may so express ourselves, in the brute creation, from the habits and actions of several of its members. It necessarily enters into the detail of facts purely Zoological and in the highest degree interesting—and if the main question be metaphysical, it is from natural history alone that its ingenious author derives his arguments in discussing it.

With respect to one of the translations in the present number, it will be seen that the inferences deduced by M. Odier, have been considerably invalidated, if not overthrown by one of our coadjutors. We have thought it right, however, to present the entire memoir to our readers, notwithstanding our conviction that the author's conclusions are erroneous. Next to establishing a truth, it is important to correct error, and it would not be fair to the learned

foreigner himself to give our comments without prefixing his text to them. The importance too, which the learned editors of the *Journal* containing the original memoir, attach to M. Odier's experiments, and the conclusion he draws from them, is an additional motive with us to translate it verbatim ; and independently of that consideration, although we differ from him as to the real nature of the carapace of insects, &c. he has given us in other respects, much new and curious information concerning it.

We shall add but little more. To insist on the importance of Natural History were to waste our own and our reader's time in proving what no rational being ever doubted. The contemplation of the works of the creation, necessarily leads the mind to that of the Creator himself—and the more intimate our acquaintance with the former, the deeper and more devoted will be our adoration of the great author of all things ! “The undevout astronomer is mad* ;” not more so than the undevout naturalist. The order, harmony, and gradations which the one traces in the planetary system, the other finds in the inhabitants of that part of it, where it has pleased his Creator to appoint his station. He sees the beautiful connection that subsists throughout the whole scheme of animated nature. He traces, from the bulk and strength of the massive elephant to the almost invisible structure of the minutest insect, a mutual dependency, that convinces him nothing is made in vain. He feels too, that at the head of all this system of order and beauty, pre-eminent in the dominion of his reason, stands Man. He sees himself the favoured creature of his Creator, and the finest energies of his soul are roused to gratitude and devotion.

* Young.

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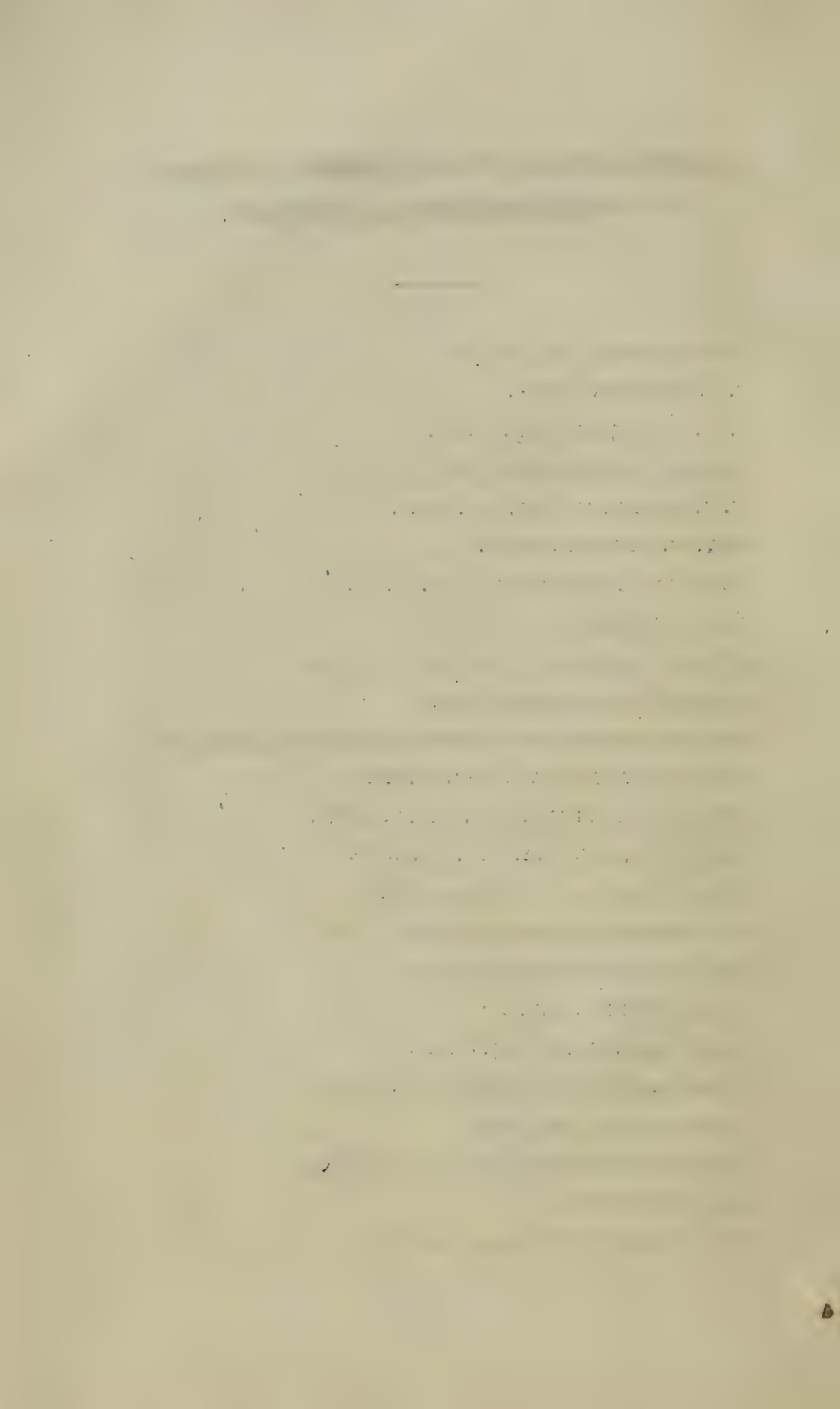
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ART. I. *An Inquiry respecting the True Nature of Instinct, and of the Mental Distinction between Brute Animals and Man; introductory to a Series of Essays, explanatory of the various faculties and actions of the former, which have been considered to result from a degree of Moral Feeling, and of Intellect.* By JOHN OLIVER FRENCH, Esq.

THE mighty and various powers of man are wonderfully imaged forth in the sensible objects that surround him; and, in the march of science, such additional evidences are continually elicited, in confirmation of this important truth, that we may perhaps be warranted in giving a philosophical assent to the sentiment of the poet,—

——That for the Instructed, time will come
When they shall meet no object but may teach
Some acceptable lesson to their minds
Of human sufferings, or of human joy,
For then shall all things speak of Man.

WORDSWORTH.

Nature's wide domain indeed exhibits a boundless theatre, in which moral and intellectual agency is ever active and employed;—strikingly manifesting its presence to the contemplative mind, in even the most common operations, the results of which have been

denominated fixed laws : for what are these but the operations of such agency producing effects for particular ends and purposes, which ends and purposes are evidently intended to be subservient to the application of the powers of the human mind, in the adaptation of all lower things to the purposes suggested by man's reason, in all the various products of the arts and sciences. These rise like a new creation from the comparatively chaotic parts of Nature, and their production is strictly comprehended within the universal plan of the Divine Artificer, who well knows how much to do for man, and what to leave within man's province, for the proper exercise of the faculties with which he endows him ; and to aid him in which exercise, Nature is thus made to unfold a rich and fertile picture of moral and intellectual qualities.

It would appear that traces of the delineation here alluded to might be found throughout the varied products of Nature ; but in the animal kingdom we find a broad and certain basis for induction, —the world of instinct, in which the various moral and intellectual powers of man are symbolically reflected, as in a mirror, even to his entrance into a glorious immortality.* In this great division of the lower creation, the qualities of foresight, industry, integrity, justice and order, sociability and mutual aid and protection, self-devotion and magnanimity, are imaged forth with an astonishing fidelity and touch of truth : and in a manner no less astonishing and faithful are displayed the opposites of all these,—improvidence, idleness, dishonesty, injustice and disorder, unsociableness and mutual disregard, selfishness and cowardice.

To the contemplative mind, final causes natural and moral are every where multiplied to the view, in the innumerable parts of the great machinery of Creation: How forcibly, in numerous instances, are the destroying passions depicted ; and how finely does the picture set off the relative beauty of their opposites—the social virtues, which in the instincts of animals are not less faithfully delineated.

This circumstance is really so striking, that, (if such an enquiry could be entered into in a philosophical dissertation) we might be tempted to ask, whether these passions of inordinate self-love,

* See Kirby and Spence's Introduction to Entomology, vol. i, p. 73, et seq.

giving birth to offensive violence, are not thus exhibited so as to affect the outward senses, through the medium of ferocious animals, in order to furnish us with the strongest possible perceptions of the nature of such passions in ourselves. But the creatures themselves are incapable of conceiving any thing respecting the nature of the moral and intellectual qualities which they thus exhibit,—to them virtue and vice are nothing : they are indeed but the passive mediums in which those qualities are represented and illustrated, in the language of God in Nature, addressed to the human mind ; and they seem to be but as types of things—of the mighty powers, moral and intellectual, which fill the mind of man, who alone is an inhabitant of the moral and intellectual world, as he is of the natural world.

Man was called by the ancients a *Microcosm*, or little world,—that is, a being whose moral and intellectual powers are represented in the subjects of nature, the utilities and ends of which latter, are reflected in him, and, as a final cause, take their rise and origin from him, in the scale of creation : and judging from all that has been said upon this subject, there can be little doubt, that as all natural things are subservient as means to things moral and intellectual ; so the former, as much as possible, would seem to be made the emblems and representatives in which the latter may be contemplated.

I have been led to offer these remarks on the final causes of lower existence, because I consider that they are so connected with the question of instinct, that, taken in a general point of view, they help to determine what sort of limited and subservient powers the brute creation may be expected, *a priori*, to possess.

The above idea it appears very necessary to keep in mind, to prevent us from assigning to brutes, mental attributes above the sphere of their common nature, and as leading us to investigate those causes which alone appear properly and rationally adequate to the production of the wonderful system and order observable in their actions. It is from failing to retain steadily in the mind's view this necessary leading principle, that we are led into erroneous conclusions respecting the powers of the brute mind, and the operative means by which the actions of brutes are effected ; which so

much resemble the operations of human intellect, that as before observed, they may be said to represent and illustrate them.

On this account considerable difficulty has been found in drawing a distinct line between the conscious discriminative powers of brutes, and those of human rationality; and in affixing a true character to the mental principles in which the actions of the brute creation originate.

Thus in considering the nature of the essential principles of brutes, philosophers have diverged into two extremes of opinion, each opinion being the result of an opposite and partial train of reasoning. One class, by referring all the essential powers of brute action to the unassisted conscious mind of the creature, have ascribed to the brute creation faculties of understanding and reasoning of the same kind with, and only differing in degree from, the rationality of the human mind.* The other class, considering the high nature of the essential powers themselves from which brute action appears to proceed, and to which they may indeed be traced, —powers which are so far exalted in intelligence above the common nature of the creatures whose actions exhibit externally their effects, as to lead the mind to look above the sphere of the creature's consciousness for a solution of their origin,—have considered that the phenomena of brute action can be no otherwise explained, than by referring it to the *immediate* operation of the divine energy.

The opinion expressed by Addison, who, following in the steps of other philosophers, says that he was impressed with the belief that the actions of brutes originate in *immediate* impression from the first Mover, and “the divine energy acting in the creatures,†” has indeed been deemed unphilosophical; and, it must be admitted, not without propriety, if this sentiment be taken to mean that brutes are mere automata. But although the penetrating mind of Addison obtained but an indistinct perception of the subject, his hypothesis is undoubtedly deserving of attention. He clearly saw

* Helvetius, *De l'Esprit*. tom. i., p. 2; et sq. edit. 1758.

New System of Nat. Hist. of Animals, by Peter Hill, Edinburgh, 1791. The author maintains, “that the laws of analytic reasoning do not justify the opinion that the brutes act on any occasion absolutely without design.”

† Spectator, nos. 121, 122.

that such adaptation of means to particular ends, such wonderful manifestation of design, could not possibly be the result of organization, as maintained by the Cartesian philosophy; but in rejecting the latter hypothesis, he overlooked the inferior kind of volition and discrimination, which appears to be included in the natural consciousness of the creature, and which no doubt constitutes its sense of life and existence; and pronounced the whole of their actions to be the *immediate* operation of the Divine Energy: not reflecting, that such *immediate* operation must, of necessity, by rendering the creatures perfect automata, deprive them of all consciousness whatever; and thus destroy that sense of life and existence derived from the class of conscious powers which it is evident they possess, and which manifestly constitutes the enjoyment of sentient being.

Now it seems demonstrable that brutes are possessed of a limited conscious discrimination and determination; which discrimination and determination do not however embrace what is either moral, intellectual, or rational, *as regards the consciousness of the creature*: but as their actions involve in them causes or powers that are evidently of a moral, intellectual, and rational order, and which powers evidently act upon the mental constitution of brutes by impressing and guiding their conscious powers of discrimination and determination to action, according to the purposes or final causes of their being;—it may therefore be justly inferred that the Divine Energy does in reality act, not *immediately*, but *mediately*, or through the medium of moral and intellectual influences, upon the nature or consciousness of the creature, in the production of the various, and, in many instances, truly wonderful actions which they perform.

If it be asked by what intermediate agency the operations of brutes are thus directed;—I reply that it is generally admitted, by a large class of mankind, at least, that superior (yet intermediate) powers of some kind, are in actual connexion with the human mind,—though not leading it blindly, as might be supposed to be the case with regard to brutes;—and if this be admitted, there remains no reasonable ground for denying the connexion and influence of similar powers, (whatever they may be), operating upon and dis-

posing to certain ends the conscious natures of brutes; which natures, if we suppose them destitute of moral and intellectual consciousness, have need of the operation of such powers to direct them. The phenomena of brute action, indeed, are inexplicable upon any other grounds; but these once admitted, there appears to be nothing in the whole circle of instinctive operations which may not be satisfactorily accounted for. I will not even venture a suggestion as to the nature of the intermediate superior powers here alluded to; but their agency, I repeat, is plainly manifest in the conduct of brutes.

As an instance illustrative of this remark, I need only mention the surprising attention of the neuter class of most of those insects which live in society, in the education of the young; an office for which it would naturally be supposed they would be wholly unfitted by the privation of the sexual character, and the consequent absence of the parental stimulus.* But the end is to be accomplished; and the animal is supplied with an inclination to accomplish it, by which it is led to the means; being impelled thereto by a moral and intellectual energy operating above its own consciousness, and which it would in vain endeavour to estimate; although with respect to its own immediate voluntary powers it may be in perfect freedom, and even have, as indeed it unquestionably has, a subordinate consciousness of the acts it performs, accompanied with a sensation of delight, as a consequence of their performance. Certain it is, from the wondrous indications of moral design, intellect, and science, discoverable in the actions of brute animals, that we must either suppose them gifted with innate conscious, moral, intellectual, and scientific faculties, and thus with those very powers which form the distinguishing characteristics of human rationality, which is however totally at variance with our observation of their general nature;—or we must allow them to possess only a subordinate consciousness and discrimination determinable to natural objects; and overruled and directed by powers or agencies operating in them above the sphere or stream of their own proper consciousness, and which powers or agencies must be of a moral, intellectual, and scientific order: thus that brutes

* Kirby and Spence's Entomol. vol. i, p. 365.

are governed by such agencies, good and evil, but under the control of Providence ; and that such agencies act by impressions upon their conscious nature, but unperceived by it in a moral or intellectual sense ;—effecting such operation by means of connate inclinations implanted in their nature, and disposing them to receive the impressions ; and which inclinations appear to constitute the ground or basis upon which is formed that lower species of consciousness, volition, and discrimination, which seems the proper attribute of the brute animal.

Upon these principles, the mixed natures of some animals are satisfactorily explained ;—as in the instance of the *Phoca Ursina*, the males of which species manifest the most singular tenderness towards their young progeny, and at the same time a savage and persecuting disposition towards their females.* These opposite and dissimilar propensities are not indicative of any moral principles that can be ascribed, otherwise than in an apparent sense, to the creature ; as will be distinctly shewn in the progress of our inquiries.

Viewed, then, in this light, and explained in this manner, Providence is conspicuous in the operations of brute nature ; and it is but reasonable to conclude that the Divine Being does indeed operate, by unseen mediums, of whatever kind they be, as the Great Regulator of the whole.

Facts have undoubtedly occurred to exemplify the operation of such agency in special interferences of Providence, through the medium of the brute mind ; of which the following well authenticated instance must be regarded as a very striking one.

At Ditchley, near Blenheim, now the seat of Viscount Dillon, but formerly of the Lees, Earls of Lichfield, is a portrait of Sir Henry Lee, by Jansen, with that of a mastiff dog which saved his life. One of Sir Henry's servants had formed the design of assassinating his master, and robbing the house ; but on the night he had intended to perpetrate it, the dog, for the first time, followed Sir Henry up stairs, took his station under his bed, and could not be driven thence : in the dead of the night, the servant, not knowing the dog was there, entered the room to execute his diabolical purpose ;

* Bingley ; *Animal Biog.* vol. i, p. 193.

but was instantly seized by the dog, and being secured, confessed his intentions. In a corner of the picture are these lines :

But in my dog, whereof I made no store,
I find more love than those I trusted more.

What an instance is this to shew the operation of a superior moral and intellectual power disposing the inclinations and perceptions of an animal, for a stated end ; while the natural volitions of the creature were at the same time exercised by it in freedom, towards the furtherance of this end. Whether we suppose the immediate means made use of to impress the animal's conscious mind, to be that of an ideal imagery or anticipated view of the intended act, with its accompaniments, the darkness, the silence, &c. &c.—and that when it really did begin to happen—when the man actually entered the room at midnight, the animal seized him as described ;—or in whatever way we regard it as having been effected, the operation of an influential power is most unequivocal. We cannot account for this cool and dispassionate magnanimity which renders the brute animal unmindful of itself, while extending its protection, and this with discrimination of circumstances, to man, unless by a directing energy, unseen by itself, acting upon its mind, and disposing it to use its immediate conscious faculties in operating according to a particular dictate ; *the animal as to all its conscious faculties and bodily powers being left in perfect freedom, although thus overruled by a presiding power, of which it is totally unconscious.* We cannot otherwise account for the apparently complex nature of brutes “which,” as beautifully observed by Addison, “thus rises above reason, and falls infinitely short of it,” and which “cannot be accounted for by any properties of matter, and at the same time works after so odd a manner, that one cannot think it the faculty (*as regards the creature*, he might have added) of an intellectual being.”

According to the view above taken then, the brute, within the sphere of its consciousness, is in perfect freedom ; thus it is by no means an automaton, but gifted with a subordinate freedom of volition, discrimination, and action, beneath the moral and intellectual sphere by which it is ruled and governed.

The foregoing, however, it may perhaps be said, is an extraordinary instance of the actions of instinct. In reply to this, the question may be asked,—are not the most common and ordinary instances of instinctive action equally illustrative of an intelligence superior to the conscious faculties of the creature ; which intelligence must therefore operate upon its conscious perception, and constitute, as it were, the *primum mobile*, actuating and impelling it to the most reasonable and circumstantial course of action that can be conceived, for arriving at the fulfilment of the ends for which it is brought into existence ? Does the spider in the curious act of weaving its web think within itself and say, ‘ I will extend my threads in this order, and connect and tie them together transversely, to secure my web from the rude vibrations of the air ; and in the terminations which constitute the central point of my web, I will provide myself a seat, where I may sit and watch what happens, and be ready to seize and envelope every fly that is caught in my trap ?—Or does the bee reason and say to itself, ‘ I will take my flight to such a field, where I know there is plenty of flowers, and I will gather wax and honey from them, and of the wax I will build contiguous cells in a particular arrangement and form, and so disposed, that I and my companions may have free ingress and egress, and in process of time may lay up a large store of honey, sufficient for our necessities during the approaching winter, that we may not starve ; and I will help to support, like a good citizen, the political and economical prudence of the community ?’

We cannot surely conceive any such process of reflection as this to pervade the consciousness of the creatures, although their acts evidently include it in some way or other ; and this I think amounts to a full proof, that reasoning is in no case the effect of instinct, as has been supposed by some philosophers ;* for it determines that the voluntary powers of animals may be most forcibly directed to a particular course of action, without any reasonable perception, either of the act or of its consequences, on the part of the animals themselves ; and shews that the instinct of animals is governed by the influence of an intelligence, (acting in this case according to an uniform mode or fixed law,) which cannot be ascribed to the animals themselves ; and which evidently acts upon them *above*

* Smellie, in his *Philosophy of Natural History*, vol. i, p. 145, asserts the reasoning faculty to be “ necessary result of instinct.”

the sphere of their proper consciousness. The same arguments are applicable to those cases, in which animals appear to act more immediately from the exigency of circumstances, that in these also they are similarly directed ; as in the case of the ostrich, an apparently stupid bird, which, in Senegal, where the heat is great, sits only by night when the coolness of the air would chill the eggs ; and in the case of parent birds, when their nestlings are confined in cages, or tied to the nest ; in which exigency, the old ones prolong their care, and continue to supply them with food, beyond the accustomed period.* It thus appears clearly evident, I think, that animals do not act with a view to consequences, from their own proper consciousness ; but that whenever they do so act, it is from a dictating energy operating above the sphere of their consciousness, and disposing them so to do : that the business of mental analysis and extraction, is performed *for them*, as it were, in every instance in which they appear to exhibit proofs of it ; and that properly speaking, there is nothing of design attributable to brutes in their actions, but merely a subordinate voluntary principle, and discriminative perception, which may be termed *natural*, to distinguish it from what is *moral, intellectual, and scientific ; to which latter principles alone design can properly be referred.* If the *appearances of design* in the animals be taken as proofs of such design being proper to them, we must be forced to admit *that they are possessed of moral, intellectual, and scientific reflection ;* but we might, upon this principle, argue the same thing of the plant, which when placed in a cellar where but a partial light is admitted, turns itself towards the ray ;—namely, that as there is the *appearance of design* in the action, we must therefore attribute design to the subject in which we perceive its effects, and thus elevate the vegetable to the intellectual sphere : and we should actually do this, did we not stop short to consider the adequacy of the *apparent* agent to the production of the effect as we behold it performed.

* A few years since a pair of sparrows which had built in the thatch roof of a house at Poole, were observed to continue their regular visits to the nest long after the time when the young birds take flight. This unusual circumstance continued throughout the year ; and in the winter, a gentleman who had all along observed them, determined on investigating its cause. He therefore mounted a ladder, and found one of the young ones detained a prisoner, by means of a piece of string or worsted which formed part of the nest, having become accidentally twisted round its leg. Being thus incapacitated for procuring its own sustenance, it had been fed by the continued exertions of its parents. B.

It becomes necessary then to establish a test whereby the operation of the moral, intellectual, and scientific powers here alluded to, may be ascertained ; and whereby the line of demarcation may be distinctly drawn between man and brute. This test, I conceive, is included in the following propositions ; viz. 1st, *That moral qualities do not become objective in the minds of brutes ; or, that the moral actions which they perform are not reflected upon or contrived by them as such ; thus that they possess no moral consciousness, and consequently that no moral design can be attributed to them ; and therefore that so much of moral design as appears conspicuous in their actions must be the effect of moral powers or energies acting upon them in a region of their minds above the sphere of their proper consciousness.* 2nd, *That intellectual and scientific qualities do not become objective in the minds of brutes ; or, that the intellectual and scientific actions which they perform, are not reflected upon or contrived by them as such ; thus that they possess no intellectual or scientific consciousness, and consequently that no intellectual or scientific design can be attributed to them : and therefore that so much of intellectual or scientific design as appears conspicuous in their actions, must be the effect of intellectual and scientific powers or energies, acting upon them in a region of their minds above the sphere of their proper consciousness.*

Admiring and respecting as I do the endeavours of all who are engaged in the promotion of philosophic enquiries, I cannot but think, that in the particular subject before us, too much has been done to confound the natures of man and brute, and to separate both from the Fountain of their existence. Man is what he is, and derives his superiority over the brute creation, from the circumstance that all things whatever become morally and scientifically objective to him ; and the brute is what he is, and derives his inferiority, from the total absence of this distinguished and ennobling faculty. It is true that many specious arguments may be and have been advanced to prove that the brutes participate in human rationality, in kind, if not in degree ; but the ends which their natures are evidently destined to fulfil, would be, one might

imagine, alone sufficient to refute the supposition. For it is but reasonable to conclude, that the conscious powers of the creature will be according to the ends of its existence ; and as these ends are in the brute creation neither moral nor scientific, but purely *natural*, and, as regards themselves, only subservient to what is moral and scientific, it thence would follow that they are not possessed in themselves of any moral, intellectual, or scientific conscious powers ;—and are therefore merely natural agents of a secondary class, in which such powers are exhibited.

I proceed to consider the first of the foregoing propositions. When we investigate the many and surprising instances in which the operations of the brute creation imply moral intention, reflection, and contrivance, we are at no loss to account for the opinion of that class of philosophers, who have attributed the mental inferiority of brutes to the mere want of adequate bodily organs ; nevertheless, the intellectual consciousness of man shrinks from the acknowledgment that in one common principle of life originate the actions of man and brute : and that brutes as to their mental constitution are thus, as it were, “ human imps lopt off from the common stock of intellect and rationality.” There is something which seems powerfully to oppose the sentiment of sharing those high endowments with creatures of so inferior a nature ; and which irresistibly leads us seriously to examine the arguments, which may be offered to prove that moral and intellectual powers *reign over the conscious perception of the brute*, and guide it to its proper exercise of those lower faculties, which it is left in freedom to use. The bee, we say, is a perfect political moralist, with respect to its actions, which evince the strictest attention to the principles of order and economy, for the purposes of the establishment and preservation of a community ; yet it is totally ignorant and unconscious of the very principles which it is so assiduous in the practice of ;—not a ray of moral perception or consciousness, can be attributed to it in a proper sense ; it is on the contrary totally destitute of the means of discerning or reflecting upon the nature or order of the ends it is instrumental in accomplishing, through the medium of its subordinate voluntary perceptions and powers.—Although it is in the habit of exercising the most accurate

science and means, for the fulfilment of these ends, it yet cannot look down with an approving or disapproving perception upon the region or sphere of its natural powers; it evidently has no perception of any moral superiority in itself over the most vulgar worm that crawls. But if brute creatures were capable of moral consciousness, they would be capable of elevation in the scale of being; and this little insect, the bee, judging from its actions, would, were it capable of that species of consciousness, not only rank above most of the larger classes of animals, but would, on the score of fidelity and integrity, put human nature to the blush.

Were it not that much has been said in favour of the alledged moral consciousness of brutes, it might perhaps be impertinent to proceed further in the endeavour to disprove it; but so strong are *appearances* in its favour, that, although we deny the affirmative in the abstract, by an unequivocal assent to the proposition, that brutes are not accountable beings; yet we are too ready to admit it in particular instances, in which we are wont to ascribe a moral consciousness to the particular moral action we see performed by an animal. There is a strong tendency to mistake the cause instrumental, for the cause principal, in this as in other cases; by which we are insensibly led to assign the sum total of the attribute to the visible agent, without stopping to consider further of the matter. Thus gratitude, which is a moral quality in man, is thought to be moral also in the dog; but surely no one, upon mature consideration of the subject, will imagine that the dog reflects on the inclination or desire he feels to act in a manner which we view as grateful; and that he is pleased with the survey and reflection;—that the moral quality of his actions becomes *objective* to him;—and yet this is absolutely necessary in order to constitute a *moral consciousness*; for to effect this, it is not only necessary that the action be outwardly or in effect moral, but that this moral action be reflected upon as such, in order that its moral quality may be thus perceived and felt. Moral consciousness can only be produced by the moral quality of the action becoming *objective*—by its being reflected upon from a superior eminence, and in a superior light,—by a soul within

and above the lower, animal, or natural mind. But that brutes do not possess this higher conscious faculty, or soul, is made evident by this;—that if a particular individual of a species did possess it, such individual would be necessarily raised by it, as to its nature; which does not in any case occur. Thus, with respect to the gratitude and fidelity of the dog, no greater *apparent* moral sagacity can be exercised by any animal; yet being totally unable to contemplate his gratitude or fidelity in the abstract, as objects of a superior perception and consciousness, those virtues are to him as if they existed not:—to man alone this moral consciousness is proper, to the animal it is absolutely a non-entity; he is not in the smallest degree more moral on account of his apparent moral qualities, for they are indeed only *apparently* his own, because they do not reach down, if I may be allowed the expression, to the seat of his proper consciousness;—but consist in powers or energies which act above it: he possesses an *apparent* moral sagacity, but without any moral consciousness or perception concerning it. To make this plain by an example: the dog, if he saves his master from drowning, or preserves his life in any more remarkable manner, such as that in the instance we have before related, reflects not upon any moral nobleness or disinterestedness in the action; he is not at all the more refined for having performed an action, which, morally considered, would tend to raise his nature; on the contrary, he lives on as before, like the rest of his canine brethren, in no respect more elevated in the scale of being; and yet it is certain that in this action his highest natural powers of proper volition, and mental discrimination and comparison, which we may term moral sagacity, have been brought into full exercise.

But it will perhaps be objected, that animals experience delight in the exercise of moral qualities as such; the dog, for instance, in gratitude. I answer, that every animal must necessarily have a delight annexed to that exercise of its powers by which it fulfils the end of its being; and the dog, as the natural guardian of man, has natural inclinations implanted in him, for the purpose of rendering him such; but his delight in the exercise of the inclinations, even when they are directed to moral acts, is purely *natural*, and

in no wise *moral*; for, as already observed, no one in this case will imagine that the dog either reflects upon his gratitude, or is pleased with it as a moral quality. On the contrary, it is plain that the animal's delight is solely owing to its conscious mind being determined to the exercise of its natural qualities or inclinations, which are those of morally unconscious obedience and friendship to man; this being the end for which he is created.

The horse, who in his aptitude for war discovers a quality necessary to render him instrumental in redressing the injuries of man, is characterised as an emulous and a generous animal; yet neither generosity nor emulation, considered as moral qualities, are objects of reflection to him; if they were, miserable indeed would be the fate of the devoted charger, whose latter existence is spent in the metamorphosis of a poor, patient, unpitied hack. But in the adorable economy of the Creator, it is provided that the sufferings of this noble animal shall be natural merely: he is incapable of being made conscious by reflection, either of the generosity, the emulation, or the pride, which his actions may have exhibited: although he has shewn them all, they have not become *objective* to him, inasmuch as he is unfurnished with a morally conscious soul, by which alone this could be effected; and it is happy for him that neither glory nor emulation can be attributed to him, otherwise than as the unconscious subject in which those high qualities are exhibited.

The mutual fidelity between the sexes, observable in doves and other birds, forms a distinguished feature in moral instinct; yet we cannot suppose that the virtue of chastity or of conjugal fidelity is at all intended by the creature, or attributable to it; although its actions are precisely the same as if such moral end were contemplated and intended by it: the polygamous species, indeed, have a claim equally as good as the monogamous, to the virtue of chastity, *as far as regards their own conscious nature*. But surely there must be moral powers which act upon and guide the natures of animals in order to produce these effects, while the creature is accessory, in apparent freedom, and unconscious of the power thus exerted on it; the wonderful exhibition of conjugal and social affections in some species of marine animals, in the *Trichechi Bo-*

reales, for instance, is altogether superior to what can be explained upon any other principles;—they will die in protecting their mates, and each other. In their manners they are peaceable and harmless, bearing the strongest attachment to each other; but when attacked, some will strive to upset the boat, by going beneath it; others fling themselves on the rope of the hook by which their comrade is held, and endeavour to break it; while others again make efforts to wrench the instrument out of the body of their wounded companion: none desert him, but persist in their courageous efforts for his rescue, even to the last! Their attachment to their mates, is, if possible, still more astonishing, and cannot be contemplated without exciting the most vivid sympathy and admiration. It is indeed the most perfect lesson of fidelity and heroic devotion*. If in this case we could suppose the creatures capable of reflecting upon the nature of their actions, which are the evident results of a moral influence, what must we think of them?—or rather, what must we not think of them? For it is to be observed, that this conduct is *adapted to circumstances*, and discovers an *apparent rational discrimination*, as well as an *apparent moral consciousness*; in the means employed by the creatures towards the accomplishment of the ends which the exigency suggests.

The controlling energies which direct the limited conscious powers of brute creatures to particular ends, are wonderfully displayed again in the economy of the cuckoo, which lays its eggs in the nest of the hedge-sparrow, and in those of other small birds; these birds, so far from molesting the young intruder,—who, in a singularly curious manner, expels its companions, the small birds' progeny, from the nest, in order that itself may be exclusively and adequately fed by the parents,—feed and cherish it, till it arrives at nearly its full growth; that is, until it is four or five times the size of the foster-parents.† The cuckoo, as if conscious that one of her overgrown nurslings would be quite sufficient for the hedge sparrow or wagtail to attend to and provide for, although she lays several eggs, deposits them in as many

* Bingley's Anim. Biog. vol. i, p. 177, et seq.

† Jenner's Observations on the Nat. Hist. of the Cuckoo, Phil. Trans. vol. lxxviii, p. 221, et seq.

strange nests, belonging to these little birds ; for she never builds herself : she acts, in fact, as if she calculated exactly what should and what would be done by others, for the rearing of her progeny. Another very curious circumstance noticed by Dr. Jenner, in connection with his remarks on the natural history of the cuckoo, is the power exercised by birds,—which, he says, may arise from “ *some hidden cause in the animal economy*,”—either of retarding or of accelerating the production of their eggs, according to circumstances. Moral and intellectual design and active energy, above the conscious faculties of the creature, is surely evident in all this ; for the creature is not a mere piece of mechanism, but has a manifest conscious freedom in the performance of its peculiar natural acts ; but which freedom is thus as manifestly controlled by superior influences, of which it is unconscious. How, otherwise, can we possibly account for the incessant endeavours of the young cuckoo to dislodge its fellow inmates of the nest, while, as yet, it has scarcely extricated itself from the egg : it cannot reflect upon the necessity of its operations either for ultimate preservation, or for present convenience ; yet it acts as if it did, and takes the most effectual means for the accomplishment of those ends. Will those who attribute design to such actions, say, that the design of taking the immediate steps necessary for the preservation of the creature can reside within its own consciousness ? It surely cannot.—The final purposes which are the primary motives of its actions, are far above what it can either conceive or survey ; otherwise the cuckoo must indeed be a “ *rara avis in terris*,” a feathered philosopher of no mean or despicable talent.

One of the strongest instances of apparent moral sagacity, is that well-known one recorded of the Elephant, which is said to have taken place in Delhi. An Elephant having killed his Cornac or governor, it is related that the man’s wife, in despair, threw her two children before the animal, saying, “ now you have destroyed their father, you may as well put an end to their lives and mine,”—upon which the animal, relenting, and taking up the biggest of the children with his trunk, placed him upon his neck, and having thus adopted him for his Cornac, would never afterwards permit any other person to mount him. In this case we cannot suppose

the animal to have reflected upon the deed of slaughter he had committed as *wrong*, nor upon the act of atonement or reconciliation as *right*, without making him an accountable agent ; there are, however, the strongest possible features of right and wrong, in the two acts and their attendant circumstances, which must unquestionably belong to an agency above the proper consciousness of the creature. For we have here a case of moral exigency, and also of reasoning and intellectual exigency ;—so much of moral and intellectual motive adapted to the circumstances and moral requirement of the case, that if the cause principal be referred to any power *within the consciousness of the creature*, we must inevitably pronounce it to be a moral and intellectual being. But surely we shall not assert this from the mere appearance of the thing, and without reference to the general quality of the animal's nature *as a whole*, which clearly, and for the reasons I have already dwelt upon, marks its limit, and designates it to be neither moral nor intellectual as to its proper consciousness ;—thus not at all so in itself, but only apparently so, by being acted upon by some power or agency above the stream of its consciousness ; and which agency must unquestionably be of a moral and intellectual character, or it never could impel the animal to the exercise of those powers of which it is conscious, in the performance of actions possessing the strongest possible moral characteristics.

If brutes then are incapable of viewing moral qualities *objectively*, and reflecting upon them as such, they must necessarily be destitute of that *perception of moral differences*, with which the power of exercising their moral sagacity must be connected ; moral sagacity, therefore, cannot exist at all in them otherwise than *apparently* ; and this conclusion is exactly what a candid estimation of brute powers seems to lead to ; namely, that they are actuated by moral energies of which they are *not conscious*, and which therefore are not properly theirs ; and that these energies operating upon their proper conscious perceptions—which may be termed *natural perceptions* to distinguish them from those which are *moral and intellectual*,—furnish the motive principles which serve to induce them to apply their conscious powers in a certain manner ;—thus producing what is apparently *moral in them*, without their

being conscious that it is so, and which thus is really not so as to them. The seat of these moral energies within them, therefore appears to be a secret region in their minds, *above the seat of their natural perceptions* ; the latter serving as a plane, as it were, for the operation of such superior powers, which, under the Divine control, dispose them to the fulfilment of the ends they are designed for.

In this manner it is possible to account for those surprising appearances of moral excellence in the actions of animals, which we observe them to display, and which are so totally above their proper conscious powers :—a moral excellence, which, as we have seen, appears in many instances more perfect and undeviating than that of the generality of human agents, and which therefore cannot be the result of any conscious freedom in the creature, unless we suppose them, in particular instances, raised higher in moral perception and determination than even man himself. It is by confounding the limited freedom of brute action with the superior energies, which, unknown to them, actuate their conscious powers, that their nature has been so far mistaken, as to be considered the same in kind with, and only differing in degree from, that of man.

Herein then consists one proper limitation of the brute mind :—although *apparently moral* it is in reality not so, but *merely natural*, and is operated upon by moral causes above its own consciousness, and which lead it to the performance of actions which, in effect, are moral, as considered objectively by the human mind.

From a comparison of this view of the nature of the consciousness of animals with that of man, the latter agent alone appears capable of considering and appreciating the nature of his own actions, and those of the inferior creation ; he alone is conscious of moral, intellectual, and scientific energies and perceptions ; and being, in consequence of this moral and intellectual faculty, at liberty to estimate and direct all lower operations, is in *moral* and *intellectual*, as well as in *natural* freedom ; whereas the brute is in the latter only. From the most dispassionate survey of brute nature, it does not appear that the creatures have any reflex perception respecting the qualities of their own discernment, or of the moral

energies, or scientific powers, which they display : on the contrary, it appears sufficiently evident that with respect to any perception of their own qualities in the abstract, the wisest is no wiser than the dullest, and the dullest is equally wise with the wisest ; the most moral as little so as the least, and *vice versa* : the Peacock has no more perception of the pride he is famed for, than the Horse or the Lion have of their generosity ; than the Fox has of his cunning, or the Tiger of his cruelty.

From these considerations, there is in appearance the strongest probability that the moral world, good and evil, may be in action upon, although above the stream of, the natural world, or above the consciousness of lower existence ; and that the former may thus operate upon the latter as a cause upon an effect. But be this as it may, it appears certain, that moral qualities being objective in the mind of man, he alone is possessed of moral consciousness and moral freedom of action ; thus is an inhabitant of both the moral and the natural world ; and that as moral qualities do not become objective in the minds of brutes, or as the moral actions which they perform are not reflected upon by them, *as such*, nor are in any respect the effects of moral choice and discrimination *on their parts*, they are therefore not possessed of moral consciousness, nor of moral freedom of action ; and thus are not inhabitants of the moral world,—although acted upon by it,—but of the natural world only.

Having thus concluded my preliminary remarks on the moral qualities exhibited by brutes, I proceed to consider those which are of an intellectual and scientific character,—to the illustration, consequently, of the second proposition given in a former page.—As moral perception appears to be excluded from the conscious sphere of the brute mind, so neither do brutes appear to possess any reflex power of contemplating the principles of intelligence and science by which, or rather according to which, they act. They appear to possess no power of taking an intellectual recognizance of this intelligence and science so remarkable in many of their actions ; and may be considered as possessing only an inferior, or what may be called animal mind, capable of being influenced or directed, but incapable of viewing or appreciating the powers or ener-

gies which thus influence and direct it in the most essential of its actions. Man is endowed with the love of science ; he, therefore, experiences a delight proper to his nature as a scientific agent, from the contemplation of a means which is instrumental in the accomplishment of an end : he is also gifted with the love of usefulness, and therefore receives a moral delight from the accomplishment of the end itself, which science is the means of effecting. Not so the brute :—the architectural contrivance and discrimination of the Beaver, which is nevertheless much inferior to that of various species of *Termites* ;—the surprising intelligence of the Hive-bee and others of the *Apes* ;—the ingenious mechanism of the spider :—all these determinations of instinct, which, when viewed in connection with the animals in whom they are displayed, are so astonishing, form no objects of contemplation to them, while to the human mind they are the subjects of intellectual perception and reflection, advancing in many instances even to sublimity.

When we observe, in the insect world, in beings apparently the most insignificant, an intelligence the most perfect, presenting the most wonderful foresight, provision, and design, we are led at once to the recognition of this intelligence, as a principle which cannot, with any degree of propriety, be attributed to the creature, as properly its own ; and we perceive, that in these instances thus to attribute it to those humble animals, would be to raise them to an eminence far above the most sagacious quadrupeds.

Innumerable are the instances among insects, in which the agency of intellectual and scientific powers, altogether superior to the proper consciousness of the creatures, is to be observed ; and it may be remarked, that as we descend in the scale of sentient being, this intellectual agency appears to develop itself in a manner proportionably more wonderful ; so as to afford the most substantial evidences of the reality of its existence and operation.

That Bees exercise the principles of a science, of which they are wholly unconscious, is beautifully exemplified in the construction of their cells ; the general form of these, it is well known, is that which includes a greater space than any other which could be given to them, without leaving a void space between the contiguous cells ; each of which, from this circumstance, supplies one of the

walls of each of the six cells which surround it. But, "it is to be remarked, that though the general form of the cells is hexagonal, that of those first begun is *pentagonal*, the side next the top of the hive, and by which the comb is attached, being much broader than the rest; whence the comb is more strongly united to the hive than if these cells were of the ordinary shape. It of course follows that the base of these cells, instead of being formed like those of the hexagonal cells of three rhomboids, consists of one rhomboid and two trapeziums."*

Here then are effects both of geometry and philosophy, although the creatures are neither geometricians nor philosophers. They indeed act precisely as geometricians and philosophers would act, were they to undertake constructing the same thing with the same end in view. Neither can we conceive them in their process of collecting honey and storing it up, as actuated by any reflection upon the nature of the act; or as contemplating a season of winter when their labours must cease. Actuated by an impressing influence to gather and store up, and led to the immediate means and to the best mode of applying them, their consciousness, although it reaches to and embraces the whole of the sensible detail of the operations to which it is directed, and includes a gratification resulting from the exercise of its inferior powers, reaches no further: their conscious world consists of the sensible images of flowers and fields and combs and honey; in these, as to themselves, "they live and move and have their being:"—they advance no higher;—they know nothing of a regular hexagon, separate from a honey comb, nor can they reason upon the consequences of their actions.

Reason, intelligence and science, therefore, cannot, as is asserted by some philosophers,† be the result of instinct; or the Bee would certainly be a reasoner: it must be evident, on the contrary, that its consciousness can reach only to the immediate inferior acts themselves, to which it is directed by a potent energy operating upon its nature.

Exercising in voluntary consciousness the inferior powers just mentioned, the animal is led and informed by an influence, im-

* Kirby and Spence, vol. i, p, 496.

† See Smellie's *Philos. of Nat. Hist.* *ut supra*.

pressing its conscious mind, and producing the effects of the most perfect science ; thereby accomplishing those objects which constitute the ends of its existence. No effect can be produced without a cause, and the Bee is either a scientific and intellectual being, or it is the instrument of an agency that is of such a quality, operating in and upon its animal mind, in a sphere above its proper perception.

Other less familiar, but not less wonderful instances of the mechanical and even philosophical powers exerted in the actions of insects, are exhibited to us in whatever quarter we contemplate their economy. The larva of a small Moth, (*P. Tinea serratella* L.) constructs a little cylindrical tower for its residence upon the surface of a leaf, and uses the utmost ingenuity to fix and retain it in a position perpendicular to the site, by attaching silken threads from a protuberance at its base to the surrounding surface ; and when the stability of its habitation is threatened by external violence, it *produces a vacuum* by drawing itself up to the summit of its tower, which at other times it completely fills ; “and thus as effectually fastens it to the leaf as if an air-pump had been employed ;” and in order to preserve the power of forming this vacuum, the insect never eats through the lower epidermis, or inferior surface of his esplanade on the leaf :—yet so insignificant is this little creature as to its bulk, that its castle appears like a small spine on the leaf to which it is attached.*

Equally curious is the history of insect architecture in other instances, as in the Aquatic Spider, (*Aranea aquatica*,) whose habitation “is built in the midst of water, and formed, in fact, of air !” This creature spins a frame work for her intended chamber, which she attaches to the leaves of aquatic plants growing at the bottom of the water, and having spread over the threads which form this frame work a transparent varnish resembling liquid glass, and very elastic, she next spreads over her belly a pellicle of the same material, and ascending to the surface of the water, by some means not fully ascertained, transfers a bubble of air beneath this pellicle, and then descending to her structure, discharges the bubble into it, until, by successively repeating the operation, she effects

* Kirby and Spence, vol. i, p. 462.

the expansion of her ærial sub-aquatic tenement to its proper habitable dimensions.*

The entire history indeed of the various species of the Spider and of the Bee teems with wonders, and supplies an ample stock of evidence in support of the proposition that they are guided and instructed by an intelligence which they do not themselves perceive. But as their history may be seen at large in the excellent work on Entomology from which our illustrations from that science have hitherto been derived, I forbear to swell the catalogue ; and shall conclude this branch of the subject, by adducing from the same work, two remarkable instances, exemplifying, in the larva of a species of *Myrmeleon*, and in the *Termes fatalis*, the most extraordinary and surprising operations, totally incompatible with any conscious scientific ability of the creatures ; appending to these some remarks on the inferences drawn by Messrs. Kirby and Spence, from a singular case of instinct, adapted to contingency, in the Humble-bee.

The first mentioned insect, whose length when full grown, is about half an inch, and whose shape slightly resembles that of the Wood-louse, is an inhabitant of the south of Europe, feeds upon the juices of Ants and other insects, digging a conical hole or pit for the purpose of entrapping them. This it effects by tracing a circle in a soil of loose dry sand, and excavating with surprising dexterity a furrow within the included space ; loading its flat head by means of one leg with a portion of the sand, which it jerks adroitly over the boundary ; and working backwards till it arrives at the part of the circle whence it started ; it then traces a new circle and proceeds with the work, constantly throwing the sand from the interior, till it completes its pit to the bottom or apex. It is indefatigable in its labours, and relieves the leg which it uses as a shovel to load its head, by working through each successive circle in an opposite direction, and thus exercising each leg alternately, always working with the one next the centre. When it meets with stones too large to be jerked from its head, it contrives to get them poised upon its back, and if in ascending the side of the pit, the stone should be again precipitated, in renewing its attempt

* Kirby and Spence, vol. i, p. 475.

to carry it up, it avails itself of the channel made by the falling stone, as a road, against the sides of which it can support and direct its load in the ascent. Stationed at the bottom of its little pit, if an Ant should stumble over the margin it hastens the descent and capture of its prey by the fall of little loads of sand which it jerks in quick succession upon the escaping insect.* All this however is surpassed by the *Termites*, whose nests are formed of clay, and are as large as huts, being generally of no less a height than 12 feet, and broad in proportion, and which when in clusters resemble an Indian village, and may at a distance be mistaken for one. The interior of one of these structures presents a most surprising skill and intelligence, both in the construction and appropriation. The apartments, avenues, and communications, consisting of vaulted chambers, built of various materials, galleries *constructed spirally for the facility of ascent*, arches or bridges of communication said to be *projected, not excavated*, are appropriated for royal and other apartments, nurseries, magazines, &c. No one can surely contemplate the gigantic, and at the same time scientific, operations of these wonderful creatures,—which yet are scarcely the fourth of an inch in length,—without feeling struck by the manifestation of an agency far above the discrimination of the subjects in whose actions it is presented, and whose economy is justly characterized as “a miracle of nature.”†

But the operations of an intelligence in the conduct of the insect race, superior to the conscious faculties of the creature, is made still more manifest by its appearance not only in what has been called *blind instinct*,—which term itself rightly interpreted, must imply the existence of controlling influences,—but also by its development in strictly contingent acts, affording evidences of the same intelligent design and adaptation, in agreement with what such particular circumstances require. That such do really occur the following extract will satisfactorily demonstrate.

“In the course of his ingenious and numerous experiments M. Huber put under a bell glass about a dozen humble bees without any store of wax, along with a comb of about ten silken cocoons so unequal in height that it was impossible the mass should stand

* Kirby and Spence, vol. i, p. 429. † Ibid. vol. i, p. 513.

firmly. Its unsteadiness disquieted the humble bees extremely. Their affection for their young led them to mount upon the cocoons for the sake of imparting warmth to the inclosed little ones, but in attempting this the comb tottered so violently, that the scheme was almost impracticable. To remedy this inconvenience, and to make the comb steady they had recourse to a most ingenious expedient. Two or three bees got upon the comb, stretched themselves over its edge, and with their heads downwards fixed their fore feet on the table upon which it stood, whilst with their hind feet they kept it from falling. In this constrained and painful posture, fresh bees relieving their comrades when weary, did these affectionate little insects support the comb for nearly three days ! at the end of this period they had prepared a sufficiency of wax with which they built pillars that kept it in a firm position : but by some accident afterwards these got displaced, when they had again recourse to their former manœuvre for supplying their place, and this operation they perseveringly continued until M. Huber, pitying their hard case, relieved them by fixing the object of their attention firmly on the table.

“It is impossible,” the authors remark, “not to be struck with the reflection that this most singular fact is inexplicable on the supposition that insects are impelled to their operations by a blind instinct alone. How could mere machines have thus provided for a case which in a state of nature has probably never occurred to ten nests of Humble-bees since the creation ? If in this instance these little animals were not guided by a process of reasoning, what is the distinction between reason and instinct ? How could the most profound architect have better adapted the means to the end—how more dexterously *shored* up a tottering edifice, until his beams and his props were in readiness ?”*

A process of reasoning, or intellectual deduction, is here certainly incontrovertible, but this, at the same time, is so much beyond the nature and condition of the creature, that we cannot suppose it performed within its proper consciousness. What then in this case, and if in this case, in every other, is the distinction between reason and instinct ? It is, I apprehend, this :—*reason* is

* Kirby and Spence, vol. i, p. 381.

a deduction of intellect within the conscious perception of the subject whose actions exhibit it :—*instinct* is a similar deduction of intellect, not within, but above the conscious perception of the subject whose actions exhibit it. For a consciousness of possessing and exercising such intelligence cannot exist without elevating its subject to that intellectual freedom which is the proper and distinguishing characteristic of human rationality.

If we ascend to the higher classes of animals, fewer instances occur of those operations which include in them principles of science; and the actions of this character which are to be observed among such animals, do not appear to arise from a conscious free principle, but to be the result of a dictation, similar to that by which the operations of the insect world are carried on; as in the case of the Beaver in the construction of his dam and hut. In the higher orders of animals, indeed, we lose sight of the more astonishing displays of science which abound in some of the inferior tribes, as in insects;—as if to mark that such science is not the conscious property of the brute nature. Thus the *Mammalia* appear to be more particularly the subjects, in which a *moral* intelligence is operative, and thus are capable of being rendered more immediately instrumental to the moral uses to which many species of them are directed by man: whereas the insect tribes appear to be more particularly the subjects in which a scientific intelligence is displayed; I say *more particularly*, because the agencies in all cases are evidently both moral and scientific, although operating diversely, so as to produce the appearance of such distinction; for in every case the influent agency must be moral as regarding the end; and scientific as regarding the means; and in the larger quadrupeds the effects of moral intelligence are as finely illustrated by the Horse, the Elephant, the Camel and the Dog, as are the effects of scientific intelligence in the operations of insects. In every case in which science is displayed in the actions of quadrupeds, it is evidently, as respects the creatures, as much above any conscious perception of their own, as it is in the case of insects:—in this respect the Bee and the Beaver are both on a par, and it would be unreasonable to concede a perception of science to the latter, and at the same time to deny it to the former. Neither does the Dog possess

any advantage over the Bee or the Beaver in this respect; the instinctive science he displays in the chase is evidently not objectively reflected upon by him, which is manifest from the fact that his ordinary nature is not at all elevated or refined by any perceptions or conclusions which would result from the view of his acute instinctive discriminations. The Dog, as we all know, is a keen and clever sportsman; but if in this case his discriminations were the result of reflection,—if he had the power of consciously reflecting in himself, at the time of the chase, on what was proper to be done and on the best means of procedure; and if this power were not derived from some hidden principle of impulse acting upon his conscious nature, he would have the power to reflect, subsequently, both upon the means and the action, the whole of which would thus be made the object of his proper reflection. He would thus be able to take an intellectual view of the chase, and of his own peculiar capabilities; the door of analysis would be opened to him; and, contrary to the fact, he would thus advance at least one step in the scale of intellect. If however we admit,—what seems to accord alike with reason and with fact,—that his conscious mind must have been, in this exercise of his instinct, impressed by an agency above it, no such consequence as that alluded to would follow, from the most wonderful display of adroitness and discrimination. The impression ceasing or subsiding with the requirement, would leave him precisely where it found him; and accordingly we find, that the Hound, who displays the most consummate skill and manœuvre in the chase, remains stationary, and does not ascend into the scale of intellectual consciousness; nor can he as to intellectual superiority be ranked above the contemned and undignified Cur.

The incongruities in the actions of brutes, afford again striking proofs that they act under the operation of an intelligence superior to the plane of their proper perception; and which, if we consider it as affecting them through a limited channel, by particular impressions on their conscious faculties, will account for the wonderful operations performed by many of them, who are not in any wise remarkable for their general sagacity; whose traits of perfection are circumscribed by an exceedingly narrow limit, and which

are yet, within that limit, truly astonishing. "With what caution does the hen provide herself a nest in places unfrequented and free from noise and disturbance? When she has laid her eggs in such a manner that she can cover them, what care does she take in turning them frequently that all parts may partake of the vital warmth? When she leaves them to provide for her necessary sustenance, how punctually does she return before they have time to cool, and become incapable of producing an animal? In the summer you see her giving herself greater freedoms, and quitting her care for above two hours together, but in winter, when the rigour of the season would chill the principles of life and destroy the young one, she grows more assiduous in her attendance, and stays away but half the time. When the birth approaches, with how much nicety and attention does she help the chick to break its prison; not to notice her covering it from the injuries of the weather, providing it proper nourishment, and teaching it to help itself; nor to mention her forsaking the nest, if after the usual time of reckoning, the young one does not make its appearance. A chemical operation could not be followed with greater art and diligence than is seen in the hatching of a chick; though there are many other birds that show an infinitely greater sagacity in all the forementioned particulars.

"But at the same time the hen that has all this seeming ingenuity, (which is indeed absolutely necessary for the propagation of the species), considered in other respects, is without the least glimmerings of thought or common sense. She mistakes a piece of chalk for an egg, and sits upon it in the same manner: she is insensible of any increase or diminution in the number of those she lays: she does not distinguish between her own and those of another species, and when the birth appears, of never so different a bird, will cherish it for her own. In all these circumstances, which do not carry an immediate regard to the subsistence of herself or her species, she is a very idiot."*

A similar incongruity, incompatible with the rational exercise of the intellectual principle of foresight, upon the supposition of that principle being proper to the mind of the creature, is ex-

* Spectator. No. 120.

hibited by the Hamster Rat, (*Mus Cricetus*). The principle of foresight as exhibited in this animal, who lays up food, "not for his winter's support, (since during that season he always sleeps,) but for his nourishment previously to the commencement, and after the conclusion of his state of torpidity,"* cannot be considered as a principle of which he has any consciousness whatever; for had the Hamster a conscious perception and appreciation of such a principle, he would be led to apply it in other cases, as well as in that of storing up food for the preservation of his life; but as if to demonstrate the irrationality of the animal, he attacks with blind fury the largest quadruped that comes in his way; instead of seeking safety by flight, like most other creatures in whom the principle of caution is observable; and which a rational foresight would necessarily impel him to, when menaced with destruction by a gigantic adversary.

The Arctic Fox, as Crantz relates, enters the water and splashes with his foot to bring up the fish, which he then seizes; and the Greenland women, profiting by his example, employ with success a similar artifice: the Fox surely does not reflect either upon the act or the means as the women must do; in him the act is evidently spontaneous, and does not flow from any thought, of which analysis is predicable.

The limitation of the brute mind, and its exclusion from intellectual consciousness, or proper reflection, is also apparent in the inutility of speech to such animals as can be taught to articulate, in effecting any thing beyond imitation; evincing clearly the incommunicability of the power of reason to the creature;—while, at the same time, it illustrates the power of the influence of the human mind, as exerted upon the mind and faculties of the animal, and ascertains the limit of that influence. There can be no reasoning without reflection, no reflection without intellectual freedom: if this reflection and this freedom were the attribute of the brute,—how, I ask, should we deny him a share of human consciousness. Does this consciousness, *in kind*, exist in the brute mind? and are they endowed with it for no other purpose than to produce,—what it could not fail to pro-

* Bing. Anim. Biog. vol. i; 452.

duce,—the sensible perception of their own individual degradation?—or, would it not follow, upon such an admission of the rationality of brutes, that we should be very likely to see the fable realized of the Mice holding a Council to “bell the Cat,” and absolutely devising a successful stratagem to effect their purpose? Is there, upon such a principle, any ground for asserting, that, with proper care, we might not be able to rear a few four-legged philosophers and mechanics, of at least tolerable erudition and science? or rather, the principle being admitted, can it be safely denied that they do not already exist?

I am aware that there is a class of actions which are in great measure modifications arising from the influence of education and habit, and which, perhaps, appear more strongly than any others to favour the supposition that brutes are possessed, in some degree, of the power of analysis and reason; but as this appearance is of so prominent a character, and is so closely allied to their specific mental capabilities, I purpose to enter upon a more particular consideration of it in the course of these Essays. I shall only remark, for the present, that the natures of brutes no doubt evince a strong susceptibility of being influenced, within certain limits, by the human mind; but this susceptibility of subservience to human intelligence, so far from militating against the views here offered of the proper nature of brutes, appears rather to strengthen and confirm the position, that they are affected by influences above their own consciousness; and that the wisdom of the Creator has so constituted their natures as to be affected by the influence of mediate agencies, in order to the production of the various ends which it may be necessary should be accomplished through their instrumentality.

I need scarcely remark that the general views attempted to be established by the foregoing observations, cannot be adequately illustrated in the limited survey of a Preliminary Essay:—their further developement must rest upon a more extended examination of the particular functions, which, taken collectively, form the brute economy. Certain it is, however, that the liberty and freedom of the human mind forms the basis of its rationality and intelligence, which is no doubt aided by an influent light and

perception, received from the Source of all Being; the consciousness of which influence connects him more immediately with that Source;—and that the absence of freedom in the brute mind, in this respect, forms the basis of its irrationality, and demonstrates that the influent light and perception which gives birth to the surprising actions we see animals perform, forms no part of their conscious nature. Thus brutes are evidently connected with the Author of Creation, though in a manner more remote than man.

The freedom of man consists in his being able to take a survey from an eminence, as it were, of the various discriminations which he himself effects, and which, by various agencies, are effected throughout lower existence; hence, although man possesses a lower or animal mind, similar, *as considered distinctly and by itself*, to the brute mind, and which inferior mind or region he looks down upon from an intellectual eminence, it is evident that his consciousness respecting even the things of this inferior region is illumined, by the glorious light of intellect and rationality which is proper to him. The brute, on the contrary, *does not survey from an elevated sphere* the discriminations which he himself effects, nor those of nature which are in operation around him; although these discriminations, as effected by himself and by the other subjects of creation around him, are calculated to lead him on in the road of analysis, did he but possess the proper faculty. May we not then infer,—That intellectual and scientific qualities do not become objective in the minds of brutes; or, that the intellectual and scientific actions which they perform, are not reflected upon or contrived by them as such; thus that they possess no intellectual or scientific consciousness, and consequently that no intellectual or scientific design can be attributed to them; and therefore that so much of intellectual or scientific design as appears conspicuous in their actions, must be the effect of intellectual and scientific powers or energies, acting upon them in a region of their minds above the sphere of their proper consciousness?

ART. II. *Monograph on the Cebriionidæ, a Family of Insects, by W. E. LEACH, M. D. &c.*

To JOHN GEORGE CHILDREN, Esq. F. R. S. &c.*

My dear Sir,

I send you a Monograph on a Family of Insects, having Cebrio for its type, which was written in the year 1815, and intended for my Zoological Miscellany; I have looked it over, and corrected it, and now send it to you for the New Journal, in which you are one of the Editors; together with the description of two undescribed species of Insects, belonging to a genus established by Latreille, under the name Phengodes.

I remain, my dear Sir, yours most sincerely,

December 19, 1823.

WILLIAM ELFORD LEACH.

CEBRIO, *Olivier, Fabricii, Rossi, et Latreille.*

CISTELA, *Rossi.*

Corpus plùs aut minùs anticè inflexum. Abdomen sæpius ellipticum, convexiusculum, aut trigonum.

Thorax capite plùs aut minùs latior. Scutellum parvum. Elytra rigida, abdominis longitudine. Sternum anticum, in nonnullis productum, in aliis concavum, margine elevata, in aliis planum aut convexum. Pedes validi, femoribus crassiusculis, compressis. Tarsi pedum anteriorum et mediorum 5-articulati; posteriorum 4-articulati.

Caput oratum. Oculi magni, rotundati, prominuli. Maxillæ membranaceæ. Mandibulæ exsertæ, validæ, hiatu interposito. Antennæ corporis ferè longitudine, 10-articulatæ, antè oculos insertæ. Labrum brevissimum. Ligulâ appendice palpigerâ instructâ. Palpi quatuor.

Body more or less inflexed. Abdomen most frequently elliptic, somewhat convex or triangular.

Thorax more or less broader than the head. Scutellum small. Elytra hard, of the length of the abdomen. The anterior ster-

* The Editors intend to give a Plate illustrative of the Genera described in this paper in a future Number.

num, in some of these genera, concave, with the margin elevated or reflexed, in others flat or convex; feet strong, thighs thick and compressed, the hinder ones bear an appendage resembling a trochanter; tarsi of the fore and middle feet five-jointed, the hinder ones four-jointed. Head oval, eyes large, rounded and prominent. Maxillæ membranaceous, mandibulæ strong, exerted, with an hiatus interposed. Antennæ nearly of the length of the body, ten-jointed and inserted before the eyes. Labrum very short; ligula furnished with a palpus-bearing appendage. Palpi four.

STIRPIUM ET GENERUM SYNOPSIS.

* *Thorax quadratus, anticè subangulatus. Sternum anticè pro-
ductum.*

Stirps 1.—Elytra integra. Antennæ et tarsi elongati:—

Antennæ articulo secundo tertio brevior, ultimo abruptè
mucronato.—I. ANALESTESA.

Antennæ articulis secundo et tertio æqualibus, aliis breviori-
bus ultimo gradatim attenuato.—II. BOSCIA.

** *Thorax transversus, anticè rotundatus. Sternum concavum,
margine dilatata, planum aut convexum.*

Stirps 2.—Elytra integra. Antennæ et tarsi crassiores et breviores.

Antennæ subcrassæ, filiformes, simplices, longæ articulis 2 et
3 brevioribus, ultimo abruptè acuminato.—III. CEBRIO.

Antennæ articulis, 2 et 3 longitudine æqualibus, latitudinem
longitudine æquante, ultimo apicem versus incrassato,
abrupte acuminato.—IV. TIBESIA.

Stirps 3.—Elytra posticè dehiscentia. Antennæ et tarsi breves.

Antennæ articulo tertio multo crassiore, ultimo apicem ver-
sus gradatim acuminato.—V. DUMERILIA.

Antennæ subabruptè extrorsum crassiores.—VI. HAMMONIA.

Antennæ filiformes, articulis moniliformibus, ultimo acuto.—

VII. BRONGNIARTIA.

GENUS I.—ANALESTESA.†

*Antennæ elongatæ, articulo secundo tertio brevior, ultimo mu-
cronato.*

* Prosternum, *Fischer.* † Habent species omnes hujus generis, caput
superne et thoracis dorsum, densè villosa.

Palpi maxillares articulo secundo longiore, articulis tertio et quarto longitudine subequalibus, hoc apice obliquè truncato.

— *labiales* articulo ultimo obliquè truncato.

Thorax quadratus, anticè subangulatus. Sternum anticum productum tarsi elongati: elytra integra.

Antennæ elongate, the second shorter than the third joint, the last pointed.

Maxillary palpi with second joint the longest, the third and fourth nearly equal in length, the latter obliquely truncated.

Labial palpi with the last joint obliquely truncated.

Thorax squared, anteriorly somewhat angulated. Anterior sternum produced. Tarsi elongated. Elytra entire.

Species 1.—Bicolor.

A.—Suprà fusca, subtùs antennis pedibusque testaceis.

Cebrio bicolor. Fabricii Syst. Eleut.

Long. corp. 16 millim:

Habitat in Barbariâ.

Mus. Latreille.

Descr.—Caput perfuscum, suprà profundè punctatum. Mandibulæ rufæ, apicibus nigris. Palpi, maxillæ et labium subferrugineo testacei. Thorax perfuscus; dorso profundè punctato. Pleura subferruginea. Pectus subferrugineum. Epigastrium et pedes saturatè testacei, tibiis et tarsis obscurioribus subfuscescentibus. Elytra fusca (sutrâ ferrugineâ) striata, jugis pustulatis, punctulis elongatis; striis latis obscurioribus.

A.—Above fuscous, beneath, the antennæ and feet testaceous.

Descr.—Head somewhat fuscous-brown, deeply punctured. Mandibles red, their apices black. Palpi, maxillæ and lip pale-ferrugineous-clay-coloured. Epigastrium and feet deep testaceous, the tibiæ and tarsi more obscure, of a pale fuscous-brown. Elytra deep brown, (the suture ferrugineous) and striated. The sides pustulated, with oblong points and broad obscure striæ.

Length $7 \frac{1}{4}$ lines.*

Inhabits Barbary.

* By a line is intended the eighth of an inch throughout this paper.—W. E. L.

36 *Monograph on the Cebriionidæ, by Dr. Leach.*

Species 2.—Testacea.

A.—Testacea, thorace saturatiore, capite fuscescente.

Long. corp. 13 $\frac{1}{2}$ millim :

Habitat —

Mus. Brit.

Descr.—Caput suprà fuscescens, punctatum, infrà testaceum ; labrum et maxillæ rufæ, his apicibus nigris. Thorax suprà saturatissimè testaceus, punctatus. Pleura, pectus, epigastrium et pedes testacei. Elytra testacea, striata, striis angustis ; interstitiis densè punctatis, punctis subelongatis.

A.—Testaceous, the thorax deeper, the head light-fuscous-brown.

Length 5 $\frac{1}{2}$ lines.

Habitat unknown.

Descr.—Head above light fuscous brown and punctured, beneath testaceous, labrum and maxillæ red, the latter with their extremities black. Thorax above very deep clay-coloured and punctured. Epigastrium and feet testaceous. Elytra testaceous, striated, striæ narrow, the interstices thickly punctulated, the punctures somewhat elongated.

GENUS II.—BOSCIA.

Antennæ elongatæ, articulo secundo et tertio æqualibus ; aliis brevioribus, ultimo gradatim attenuato.

Palpi maxillares, articulis secundo et tertio longitudine æqualibus, primo crasso, quarto ovato, ad apicem acuminato.

— *labiales* articulo ultimo obliquè truncato.

Thorax quadratus, anticè subangulatus. Sternum anticum anticè productum. Tarsi elongati. Elytra integra.

Antennæ elongated, the second and third joints equal ; the others shorter, the last gradually attenuated.

Maxillary Palpi, with their second and third joints equally long ; the first thick ; the fourth oval, at its extremity acuminated.

Labial palpi, with their last joint obliquely truncated.

Thorax squared, anteriorly somewhat angulated. Anterior sternum produced anteriorly. Tarsi elongated.

Species 1.—Picea.

B.—Corpore toto piceo, anteunis, palpis, pedibusque testaceis.

Long. corp. 14 $\frac{1}{2}$ millim :

Habitat in Americâ Boreali.

Mus. Bosc.

Descr.—Thorax profundè impresso-punctatus. Elytra tenuitè striata, interstitiis elevato-striatis. Superficies inferior punctulis impressis.

B.—Body entirely pitch-coloured, the antennæ, palpi and feet testaceous.

Length $5\frac{1}{2}$ lines.

Inhabits North America.

Descr.—Thorax impressed with deep punctures; the elytra slightly striated, the interstices with elevated striæ; the under part of the body impressed with small punctures.

Species 2.—Punctata.

B.—Corpore toto aterrimo impresso-punctato. Antennis, palpis et pedibus piceis.

Long. corp. 2 centim : 1 millim :

Habitat in Americâ Boreali.

Mus. Bosc.

Descr.—Thorax profundissimè, elytra mediocriter, superficies inferior et pedes leviter impresso-punctati.

Body totally jet-black, and every part with impressed punctules; the antennæ, palpi and feet pitchy-black.

Length about an inch.

Inhabits North America.

Descr.—Thorax very deeply impressed, the elytra moderately, the under side and the feet lightly studded with impressed punctures.

Species 3.—Olivacea.

B.—Corpore suprâ et infrâ olivaceo; pedibus, antennis palpisque olivaceo-viridescentibus.

Long. corp. 1 centim : $3\frac{1}{4}$ millim :

Habitat in Americâ Boreali.

Mus. Bosc, Dumeril, Brongniart, Latreille.

Descr.—Thorax et elytra leviter punctati, superficies inferior glaberrima, punctis minutissimis sparsa.

B.—Body above and below olive-colour; the feet, antennæ, and palpi of an olive-colour approaching to greenish-olive.

Length $7 \frac{1}{4}$ lines.

Inhabits North America.

Descr.—Thorax and elytra slightly punctured ; the under surface of the body very smooth, sprinkled with very minute impressed punctures.

Species 4.—Glabra.

B.—Corpore nigrescente, glaberrimo ; capite, thorace, elytris, et superficie inferiore, punctis minutissimis sparsis.

Long. corp. $8 \frac{1}{2}$ millim :

Habitat in Americâ Boreali.

Mus. Bosc, Latreille,

B.—The body blackish, and extremely smooth ; the head, thorax, elytra, and the under parts of the body, sprinkled with very minute punctures.

Length $4 \frac{1}{4}$ lines.

Inhabits North America.

Species 5.—Minuta.

B.—Corpore glaberrimo, rufescente ; antennis, palpis et pedibus rubris.

Long. corp. $4 \frac{1}{3}$ millim :

Habitat in Americâ Boreali, rarissima.

Mus. Bosc.

Descr.—Caput et thorax profundè impresso-punctati. Elytra leviter striata, interstitiis impresso-punctatis. Superficies inferior punctis minutissimis sparsa.

B.—Body very smooth and reddish ; the antennæ, palpi, and feet red.

Length 2 lines.

Inhabits North America, and is a very rare species.

Descr.—The head and thorax deeply punctured ; the elytra with slight striæ ; the interstices with impressed punctures ; the under part is sprinkled with innumerable and very minute punctures.

GENUS III.—CEBRIO.

Antennæ subcrassæ, filiformes, simplices, longæ, articulis secundo et tertio brevioribus, ultimo abruptè acuminato.

Palpi maxillares filiformes, capitis longitudine, articulo secundo longiore ; articulis tertio et quarto longitudine æqualibus, hoc clavato.

Palpi labiales articulo ultimo clavato.

Thorax transversus, subtrapeziformis, margine posticâ latiore. Sternum anticum posticè mucronatum ; femora posticè appendice trochantiformi instructâ.

Antennæ rather thick, filiform, simple, long, the second and third joints shortest, the last joint abruptly acuminate.

Maxillary palpi filiform, of the length of the head, the second joint longest, the third and fourth joints are equal in length, the fourth clubbed.

Labial palpi with their last joint clubbed.

Thorax transverse, somewhat trapeziform, the hinder margin broader ; anterior sternum pointed behind ; hinder thighs furnished with a trochantiform appendage.

Species I.—*Promelus*.

C.—Castaneo-testaceus ; capite, antennis et thorace nigris, pectore epigastrio tibiis tarsisque fuscescentibus, coxis femoribus ventrique testaceo-croceis.

Cebrio gigas. *Fabr. Syst. Eleuth.*

Cebrio promelus. *Latreille, MSS.*

Long. corp. 2 centim : 3 millim :

Habitat in Galliâ Australi, et in Agro Pedemontano ; in campis post tempestates et in Paludibus. *Latreille,*

Descr.—Pleura ferrugineo-testacea ; caput, thorax et elytra punctati, testaceo-villosi ; villi breves. Thorax lineâ longitudinali elevatâ nitidâ, glabrâ ; elytra elevato-lineata ; striis medio-cribus.

C.—Chestnut-clay-coloured ; antennæ and thorax black, the breast, epigastrium, tibiæ, and tarsi fuscous brownish, the coxæ, thighs, and abdomen beneath of a clay-crocus colour.

Length 1 inch, 1 $\frac{1}{2}$ line.

Inhabits the South of France, and Piedmont ; in plains after tempests and in marshes.

Descr.—Pleura ferugineous clay-coloured ; head, thorax, and elytra punctured, with clay-coloured down ; the down short. Thorax with a longitudinal elevated shining line ; elytra with elevated lines, the striæ moderate in size.

Species 2.—Fabricii.

C.—Ater, epigastrio, coxis, femoribus, abdomineque toto croceis ; tibiis tarsisque fuscis.

Long. corp. 1 centim : $3 \frac{1}{4}$ millim :

Habitat in Lusitaniâ et Hispaniâ, (regione Valentinâ).

Mus. Latreille.

Descr.—Antennæ supra nigro subtus ferrugineo-villosæ ; villi longi ; corpus subtus croceo vestitum, femora apice extremo fusciscentia.

Obs.—Elytra fortius elevato-lineata, sulcis intermediis latis.

C.—Black, with the epigastrium, coxæ, thighs, and the abdomen totally saffron-coloured, tibiæ and tarsi fuscous-brown.

Length $4 \frac{1}{2}$ lines.

Inhabits Portugal and Spain in the province of Valentia.

Descr.—Antennæ, above with black, below with ferruginous down, body beneath clothed with saffron-yellow down, the thighs at their extremities fuscous-brownish.

Obs.—The elytra are more strongly furnished with elevated lines, and the intermediate grooves are broad.

The elevated lines of the elytra, are not to be perceived easily on the upper aspect. In the only specimen which I had an opportunity of examining, I observed on the thorax three impressions 1—2.

Species 3.—Morio.

C.—Ater, femoribus utrinquè lineâ subtestaceâ, coxis 4 anticis testaceis.

Long. corp. $11 \frac{1}{4}$ millim :

Habitat in Lusitaniâ et Hispaniâ, regione Valentinâ.

Mus. Latreille, Macleay, Nostr.

Descr.—Caput, thorax, dorsum et elytra nigro-villosi ; villi longi ; antennæ suprâ nigro subtus ferrugineo-villosæ ; epigastrium, pectus et femora fusco-ferrugineo-villosa ; elytra medio-criter elevato-lineata ; sulcis intermediis mediocribus.

C.—Black, the thighs on each side marked with a somewhat clay-coloured line, the four anterior coxæ clay-coloured.

Length 5 lines.

Inhabits Portugal and Spain in the province of Valentia.

Descr.—Thorax, back, and elytra punctated, and covered with black down; the down long: the antennæ above covered with fuscous-brown, and beneath with ferrugineous down; the epigastrium, breast and thighs covered with brown-rusty down; elytra with elevated lines; the intermediate grooves moderate.

GENUS IV.—TIBESIA.

Antennæ articulis 2 et 3 longitudine æqualibus, latitudinem longitudine æquantè, ultimo apicem versùs incrassato, abruptè acuminato.

Palpi maxillares, capite breviores, articulis 2 et 3 æqualibus; quarto præcedente paulò longiore, apicem versùs gradatim crassiore, apice obsoletissime obliquè subtruncato rotundato.

— *labiales*, articulo ultimo gradatim clavato.

Thorax transversus, anticè rotundatus; sternum anticum concavum, margine dilatata; tarsi crassi et breves.

Antennæ, with their second and third joint equal in length, not broader than long, the last joint towards its extremity thickened and abruptly sharpened.

Maxillary palpi shorter than the head, the second and third equal; fourth a little longer than the preceding one, towards its apex gradually thicker, the apex very obsoletely and obliquely somewhat truncated, and rounded.

Labial palpi, with their last joint clavated.

Thorax transverse anteriorly rounded; anterior sternum concave with its margin dilated; tarsi thick and short.

Species 1.—Ruficollis.

T.—Castaneo-ferruginea, capite nigro, elytris subcastaneo-testaceis, antennis castaneo-fuscis.

Cebrio ruficollis. *Fabr. Syst. Eleut.*

Long. corp. $6 \frac{1}{4}$ millim :

Habitat in Barbariâ.

Mus. Latreille.

Descr.—*Antennæ* articulis tribus basilaribus, labio, maxillis, palpisque ferrugineo-testaceis; mandibulæ rufo-ferrugineæ. Caput fortè punctatum. Thorax punctatus, elytra lævius punctata, obsoletè striata.

C.—Chestnut-ferrugineous, the head black, elytra pale chestnut-clay-coloured, antennæ chestnut-brown.

Length $3\frac{1}{2}$ lines.

Inhabits Barbary.

Descr.—Antenna with its three basilar joints, the lip, maxillæ and palpi ferrugineous-clay-coloured; mandibulæ red-ferrugineous; head deeply punctured; thorax punctured; elytra smooth punctured, obsoletely striated.

GENUS V.—DUMERILIA.

Antennæ breves, articulo tertio multo crassiore, ultimo apicem versus gradatim acuminato.

Palpi maxillares articulo secundo longiore, articulis tertio et quarto longitudine æqualibus, ultimo gradatim attenuato.

——— *labiales* articulo ultimo obtusè truncato.

Thorax transversus anticè rotundatus. Sternum anticum convexum.

Tarsi breves.

Antennæ short, the third joint the thickest; the last joint towards its extremity gradually acuminated.

Maxillary Palpi with the second joint longest, the second and third equal in length, the last joint gradually attenuated.

Labial Palpi with the last joint obtusely truncated.

Thorax transverse, rounded before; anterior sternum convex; tarsi short.

Species 1.—Pulchra.

D.—Capite nigro, thorace et elytris sanguineis, pedibus rufescentibus, abdomine infra cæruleo-nigro nitente.

Long $5\frac{1}{2}$ millim :

Habitat in Africâ Australi.

Mus. Dumeril, Latreille, Bosc.

Descr.—Caput fortiter impresso-punctatum, thorax politus glaberrimus, elytra tenuiter striata, interstitiis reticulatis, superficies tota inferior punctis numerosissimis sparsa.

D.—Head black, thorax and elytra sanguineous, feet reddish, abdomen beneath of a shining blue black.

Length $2\frac{1}{4}$ lines.

Inhabits southern Africa.

Descr.—Head with deeply impressed punctures, thorax polished and very smooth, elytra slightly striated, the interstices reticulated;

the whole inferior surface of the body is sprinkled with innumerable impressed punctures.

In the collection of Latreille, I saw a mutilated specimen of a species, which from its general form seemed to belong to this genus. It came from Barbary.

GENUS VI.—HAMMONIA.

Antennæ articulis 2 et 3 longitudine æqualibus extrorsum crassiores.

Palpi maxillares capitis ferè longitudine, articulo secundo longiore; articulis tertio et quarto longitudine æqualibus, hoc subclavato.

—— *labiales* abruptè clavati.

Thorax transversus, anticè rotundatus; sternum anticum planum; tarsi breves.

Antennæ with the second and third joints of equal length, externally thicker.

Maxillary Palpi almost as long as the head, the second joint longest; the third and fourth equal in length, the latter slightly clavated.

Labial Palpi abruptly clavated.

Thorax transverse, anteriorly rounded, anterior sternum flat, tarsi short.

*Species 1.—Latreillii.**

II.—Castaneo-testacea, elytris sordidè testaceis.

Long corp. 5 $\frac{1}{4}$ millim:

Habitat in Etruscâ et in Galliâ Australiore, rarissimè

Mus. Latreille.

Descr.—Caput, thorax et elytra punctata; his striatis; striis discoideis, posticè confluentibus.

II.—Chestnut clay-coloured, elytra dirty clay-coloured.

Length 2 $\frac{1}{3}$ lines.

Inhabits Tuscany and the southern parts of France very rarely.

Descr.—Head, thorax and elytra punctured; the latter striated; the striæ discoidal, confluent behind.

* M. Latreille informed me that this species was named by some author *Cebrio brvicornis*.

Species 2.—Melanocephala.

H.—Rufescens, capite nigro, elytris tenuiter striatis, thorace nigro-punctato.

Long corp. 1 centim : $1\frac{1}{4}$ millim ;

Habitat in Hispaniâ, et Lusitaniâ, rarissimè.

Mus. Bosc.

Descr.—Caput et thorax impresso-punctati; elytra glabra; abdomen infra punctis numerosissimis impressum.

H.—Reddish, head black, elytra slightly striated, thorax spotted with black.

Length $4\frac{1}{2}$ lines.

Inhabits Spain and Portugal; very rare.

Descr.—Head and thorax with impressed punctures, elytra smooth, abdomen beneath with innumerable impressed punctures.

GENUS VII.—BRONGNIARTIA.

Antennæ breves, filiformes, moniliformes, articulis secundo et tertio longitudine æqualibus, ultimo acuto.

Palpi maxillares filiformes, articulo secundo longiore; articulis tertio et quarto longitudine æqualibus, quarto acuto.

— *labiales* articulo ultimo gradatim clavato.

Thorax transversus, anticè rotundatus, sternum anticum convexum, tarsi breves.

Antennæ short, filiform, moniliform, the second and third joints of equal length, the last acute.

Maxillary Palpi filiform, the second joint longest; the third and fourth of equal length, the fourth acute.

Labial Palpi, with the last joint gradually clubbed.

Thorax transverse, anteriorly rounded, anterior sternum convex, tarsi short.

Species 1.—Atra.

B.—Corpore, pedibus et antennis atris; thorace profundè impresso-punctato, elytris punctato-striatis.

Long. corp. $7\frac{1}{4}$ millim :

Habitat in Barbariâ.

Mus. Brongniart, Bosc, Latreille.

B.—Body, feet, and antennæ black, thorax deeply impressed with punctures, elytra impressed with lines of punctures.

Length 4 lines.

Inhabits Barbary.

On two Species of the Genus Phengodes of Latreille's Mss.*

Character genericus mihi non examinandus.

Obs.—Antennarum rami ciliati.

I. PHENGODES *testaceus*.

P.—Testaceus, elytris apicibus antennisque fuscis.

Lampyris† plumosa, *Olivier*.

Long. Corp. 11 millim :

Habitat —.

Mus. Nost. ♂

Descr.—Oculi mediocres prominuli, nigri; corpus totum glabrum; tarsi posticè pallidè fuscæscentes; abdomen segmentis medio fuscæscantibus, posticè pallidè testaceis.

P.—Testaceous, elytra at their extremities, and the antennæ fuscous-brown.

Length 4 lines.

Locality unknown.

Descr.—Eyes moderate, prominent and black; all the body smooth; tarsi behind pale, inclining to fuscous-brown; the middle segments of the abdomen inclining to fuscous-brown, behind pale clay-coloured.

II. PHENGODES *flavicollis*.

P.—Fuscus, thorace pectoreque fuscis.

Phengodes flavicollis. *Latreille Mss.*

Long. corp. $4\frac{1}{4}$ millim :

Habitat in Peruvîa.

Mus. Latreille.

Descr.—Oculi magni, globosi, nigri. Vertex nigricans. Os subferrugineum. Palpi fuscæscentes. Alæ pallidè fuscæscentes. Pedes

* The Baron Dejean in his catalogue of Coleoptera has Phengodes as a name given by Count Hoffmannsegg. G. S.

† More correctly Lampuris.

? flavis.

fusci, coxis flavis. Abdominis dorso basi flavo. Venter segmentis posticè pallidis; penultimo et antepenultimo medio maculâ flavâ notatis.

Obs.—Antennæ quam in *P. testaceo* paululùm longiores.

P.—Fuscous-brown, thorax and breast yellow.

Length 2 lines.

Inhabits Peru.

Descr.—Eyes large, globose, black; vertex blackish; mouth somewhat ferrugineous; palpi pale-fuscous brown; wings paler than the palpi; feet pale-fuscous brown, their coxæ yellow; the back of the abdomen with its base yellow; segments of the belly yellow behind; the last but one, and the one behind it marked in their middle with a yellow spot.

Obs.—The antennæ of this species are longer than in *P. testaceus*.

ART. III. *On the situation and rank of Sponges in the Scale of Nature, and on their internal Structure, by Mr. JOHN EDWARD GRAY.*

THE true nature of these curious bodies has for a long while been an object of great doubt to all Naturalists, for we find that most of the *Ancient Natural Historians* apparently regarded them as animals, although their allusions are very obscure, for *Pliny*, *Dioscorides*, and their commentators, *Mathiolus*, *Belonus*, *Barbarus*, &c. &c. divided them into male and female sponges, and *Aristotle* in his *Historia Animalium* v. chap. 16, observes “many people were of opinion that sponges were capable of feeling, and that they would shrink back if any one attempted to pluck them,” however he regrets this idea; but *Imperati* has pretended to distinguish two sorts of movement common to them, the one produced by the sponge itself, and the other dependant on the nature of its substance; but *Ellis*, who has quoted the above passage in his *Corallines*, only argues on the possibility of such movement, and neither there or in his *Zoophites*, appears to have observed it himself; nor were *Peron*, or *Bosc*, who studied these substances, where they were of a large size and in immense abundance, able

to discover the slightest trace of mobility, therefore if it exist it has escaped the notice of these naturalists; the only modern author who appears to have thought he observed any motion, is Montagu, see Wernerian Transactions, vol. ii. On the revival of learning the only author who regarded them as animals was Nuremberg, in his *Historia Naturæ*, published in 1635, which is only a compilation of the ancient authors; but all those who would examine for themselves considered them as vegetables, among whom there are *Bauhine*, *Ray*, *Tournefort*, *Morisson*, *Boerhaave*, *Seba*, *Vaillant*, *Marsilli*, and even *Linnaeus* himself, in the prior edition of his works, classed them as plants; and *Forsküll*, one of the most distinguished of his pupils, and a most excellent zoologist, persevered in this theory even after the change of opinion of his master, produced by the beautiful discovery of *Peyssonell*, *Trembly*, and *Ellis*. From this period, which was about a century after the publication of Nuremberg, they were again placed in the animal kingdom, but only on account of the analogy of their appearance and manner of life, and not from the known existence of the animals, as may be known by the character which this zoologist has given to the genus. *Linnaeus* appears, like the ancients, to have considered them as animals themselves, respiring water, for he thus characterizes them in the last edition of his *Systema Naturæ*, “*SPONGIA. Flores (Foraminibus respirat aquam,) Stirps radicata, pilis contexta, plexilis, bibula.*” After this period the zoologists were attracted by the gelatinous coat, first mentioned by *Ellis*,* which they appear to consider as an animal substance; for thus *Pallas*, in 1766, characterized this genus:—*Spongia*: animal ambiguum, crescens, *torpidissimum*. *Stirps polymorpha, fibris contexta, gelatina viva obvestitis*. *Oscula (flores Lin) oscillantia seu cavernæ cellulæve superficiæ*. *Solander* and *Ellis*, in their *Zoophytes*, in

* *Ellis*, in his *Corallines*, thought that the pores were tubes, and contained the animals as in tubularia, &c. for he observes that they are formed of a reticulated mass of *tubes*; and “in viewing the extremities of the upper or last shoots we shall perceive small openings at the end of their fibres, and as we trace the fibres back from the opening downwards we see a soft whitish substance which fills the internal part of all the ramifications through the whole sponge;” he continues to observe they “are doubtless the lodgments of animals of a particular class;” but this he appears to have given up in his *Zoophytes*.

1786 ; *Bruguère*, in the French Encyclopedia ; *Lamarck*, in his *Système* ; *Bosc*, *Cuvier*, in his *Regne Animal* ; and *Lamouroux*, in the *Bulletin Philomatique*, have given nearly the same characters, only leaving out or adding a few words of no consequence, as *Solander*, respecting their being formed of spiculæ and fibres, and *Cuvier*, that the animal jelly is destitute of any organs, or polypes ; but *Lamouroux*, in his *Histoire*, has placed the marine and fresh water species in one family with this character, which plainly shews that he is doubtful of the animal structure, “ polypiers spongieux, inarticulés, poreux, formés de fibres entrecroisées en tout sens coriacées ou cornées, jamais tubuleuse et enduites d’une humeur gelatineuse, très fugace, et irritable suivant quelques auteurs.”

From these characters it appears that the greatest dependance is placed on the living principle existing in the gelatinous coat ! which appears to be the most essential and the animal part of the sponge. But to what class of animal does it belong ? for its form, as the last mentioned author has stated is subordinate to that of its habitation ! is it only an animated mass ! which it is possible to divide without destroying its vital principle, and in which there is no sensible organization ! without any apparent voluntary movement, or only such as cannot be seen by the eyes of modern zoologists ; destitute of a mouth or any kind of organs ; or is it in a word an animal differing from all other animals. *Blainville*, in his new distribution, has observed this anomolous structure, and has formed a sub-kingdom in his animal kingdom, for the reception of it, and the *Monadaires*, and the *Corallines*, under the name of *HETEROMORPHES* or *HETEROZOAIREs*, from their irregular shape. But it unfortunately so happens that the sponges and corallines have very little affinity with the *monadaires* or *acrita* of Macleay, which are free animals almost entirely formed of cellular substance, without any visible fibres or bony structure.

Lamarck, in consequence of the similarity remarked by Ray and Pallas of this genus to alcyonium, places it next to that genus and thus characterizes it in the *Annales du Museum* and in his *Histoire* : *Polyparium* polymorphum, fixum, molle, gelatinosum et subirritabile in vivo. Exsiccatione, tenax, flexile, porissimum, aquam respirans.

Axis, *Fibræ* innumeræ, *corneæ*, *flexiles reticulatim contextæ et connexæ*. *Crusta* gelatine subviva *fibras vestiens fugacissima* in polypario e mari emerso partim elapsa evanida, *Polypi* ignota; observing at the same time that he considers them as the most imperfect, and in fact the end of animated nature; but his idea of the similarity of this genus to *Alcyonium* must have been caused by his only having been able to compare dried specimens, for when these two genera are fresh and alive they are exceedingly different, the one offers a fibrous mass covered with a slippery gelatinous mucus like the white of egg, without any traces of organization; while the *Alcyonium*, on the contrary, offer a more or less solid mass susceptible of slight motion, with distinct regular cells, in which the polypes are contained, and out of which they appear in still water, though indeed when dry the two genera are so similar, that several of the *Alcyonia* have been considered as sponges, and vice versa; but *Lamarck* has, I believe, with very little reason, separated the fresh water species and placed them in a different part of his system, near the *Tubulariæ*.

And again at the beginning of this century, we have such men as *Targioni*, *Tozzetti*, and *Spalanzani* returning to the old doctrine, and persisting in regarding the sponges as belonging to the vegetable kingdom, to which theory, as I have before stated, *Lamouroux* appears to incline. Some chemical zoologists have classed the sponges with the animal kingdom on account of the odour which they emit when they are fresh, and when they are burnt; but these characters are fallacious, for most of the marine plants emit when burnt an odour analogous to that of animal substances, which appears to originate in the simplicity of their structure and their habitation.

With this difference of opinion who can be right? we have names of equal authority in support of their being vegetables, animals themselves, and the habitation of animals! But upon examination we shall find that there is much more reason to consider them as vegetables, for those who regard them as animals always speak of their being excessively torpid, and indeed so torpid that not one of them gives us any reason for believing that they have themselves seen them move; and *Lamarck*, who considers them as polypiers

has not seen the polypes, and appears to have been only lead to that conclusion by a false analogy from his having examined dried specimens, and there has only been two affinities pointed out with regard to the animal, the one just noticed, and the other by *Blainville*, which I have remarked on, while they have the general appearance and structure of many marine algæ; and if the marine and the freshwater agree in their manner of growth, there is little doubt but that they must be removed to the vegetable kingdom.* Walking one day on the bank of the Thames, when the tide was very low, I observed a quantity of a green substance on the shore far from the bank, just above Kew bridge, which on examination proved to be a freshwater sponge; having collected a considerable quantity I brought it home, when on putting it in water a number of green granules were washed out, which came more plentifully when the sponge was squeezed, and left only a light coloured very brittle fibrous substance; there were a few partly decayed leaves at the bottom of the basin, on which the green granules fell. Being called away I left them there for a day or two, when on my next examination I found they had formed a more velvety mass, through which visible fibres were shooting, which gradually enlarged, thus growing entirely after the manner of vegetables; the granules were very minute, and I thought had all the appearance of the genera of Algæ.

I have very little doubt that if the mucilaginous substance of the marine sponge be examined, it will be found to contain similar grains, but not having the opportunity of going to the sea side since making the above observation, I have not been able to verify my idea; I hope, however, that some person near the coast will examine the fact, so as to settle this long doubtful point, and thus greatly assist the possibility of arriving at a natural arrangement, in which either the introduction of an heterogeneous body, or the absence of an analogue, is the object of great consideration. But

* Especially *Ulva diaphana*, which has been considered as an *Ulva* by many, as *Fucus* by Hudson, and *sponge* by Parkinson, and as *alcyonium* by Gmelin, &c. with a description of its *polypi*; but lately formed into a genus by Lamouroux under the name of *Alcyonidium*; it certainly has no polypes, for I found it in abundance at Sheerness.

these are not the only substances which should be removed from the animal to the vegetable kingdom, for the whole of the *Poly-piers calcifères*, of *Lamouroux*, (except perhaps *acetabularia*) are equally of vegetable origin, as well as several of the *Alcyonia*; for in fact the zoophytes have been a receptacle for every simple organized substance which naturalists did not exactly know where to place, as we may observe by *Savigny* having removed several of the latter genus to *Mollusca*. With regard to the *structure* of this curious tribe, it appears that *Ellis* regarded the fibres as tubular, and *Lamouroux* in his character has “*jamais tubuleuse*,” but upon two species figured by the former author he observed, that the *C. oculata* is formed of reticulated fibres, and the other (*C. urens*) of fascicules of spiculæ, and from these observations he appears to have formed his character in the manuscript of his zoophytes, which was published by *Solander*; all the other authors have regarded them as a reticulated fibrous mass, covered with a jelly-like substance; and *Lamarck*, in speaking of the axis and crust appears to refer to the same substances, he separates this family into three genera, on account of their structure: first, the *spongilla*, or freshwater species, which he regards as consisting only of fibres; secondly, the *Tethya*, which has a small quantity of gelatinous crust, and the fibres rather tangled and radiating toward the circumference, and the *Spongia* he thinks only differs from the *alcyonia* in having a slimy and deciduous crust, but on examining the sponges which have come under our observation, (not a small number of species) they all appear to be essentially formed after the same manner, that is to say, of *longitudinally placed transparent fusiform spiculæ*, which vary considerably like the species, in size and in the closeness of their connection, for in those species that appear to be fibrous, the fibres are composed of spiculæ, united together by a cartilaginous substance*, and the *Spongia tomentosa*, which is the one said to be formed of bundles of spiculæ, by *Ellis*, if it be carefully examined, by breaking it from the centre of the base to the circumference, the spicula will be found to be disposed and slightly united into fibres, leaving cells; but

* Which fibres in some of the species are so small that the spiculæ are not to be discovered without the assistance of a high magnifying power.

when it is broke transversely it appears to be formed irregularly ; and in the *Tethya* the spiculæ are very large, and are felted together, with their points towards the surface, into a hollow subglobular form, so that it is in fact originally a tubercle, formed of *one* series of spiculæ, which from the intervention of new spiculæ between the old ones, increases in diameter, and thus produces the central space. The spiculæ of species which I examined had the base slightly cut into two or three radiating processes.

Notwithstanding I so strongly urge the placing of this family amongst the Algæ, yet I own that I do not know any exactly similarly formed vegetable*, although they agree more with them than any known animals ; in fact they appear from their internal structure to approach some of the acicular crystalline substances of the mineral kingdom.

* Except, perhaps, from the description, *Echinella acuta* of Lingby, which appears to be similar, and his *figure of the granulæ*, as he calls them, corresponds with the spiculæ of several sponges, except that I have not observed any transverse lines in them, but there has been a difficulty to which kingdom this genus belongs ; it is now almost generally considered as a vegetable.

ART. IV. *Description of a new species of Emarginula.*

By THOMAS BELL, Esq. F. L. S.

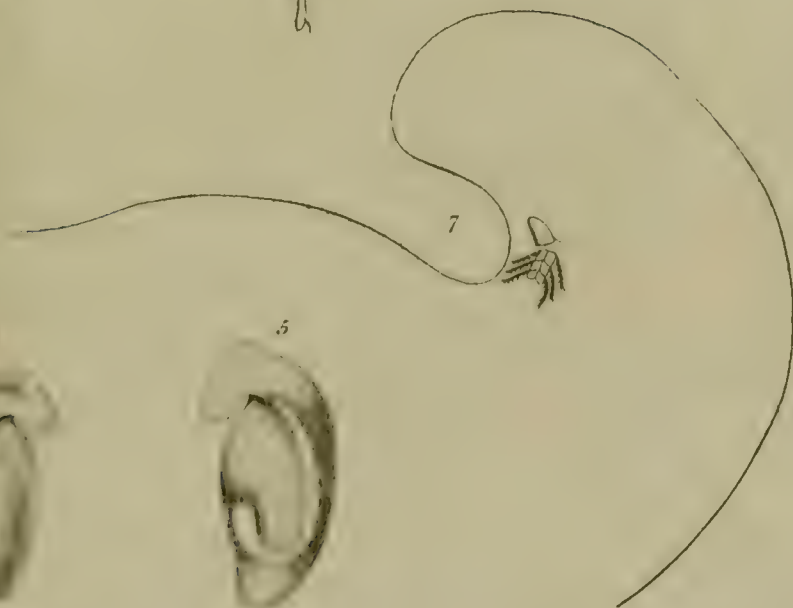
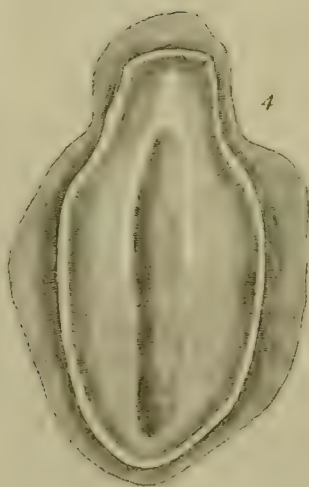
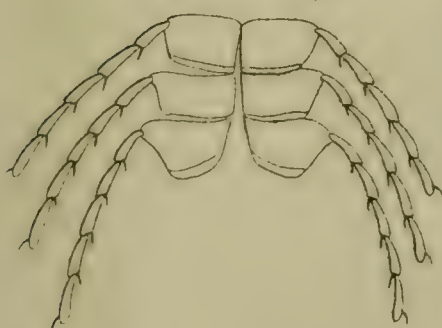
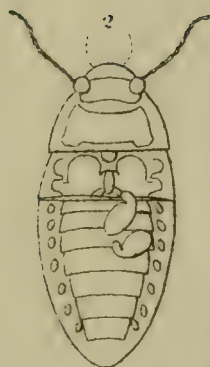
EMARGINULA. *Lamarck.*

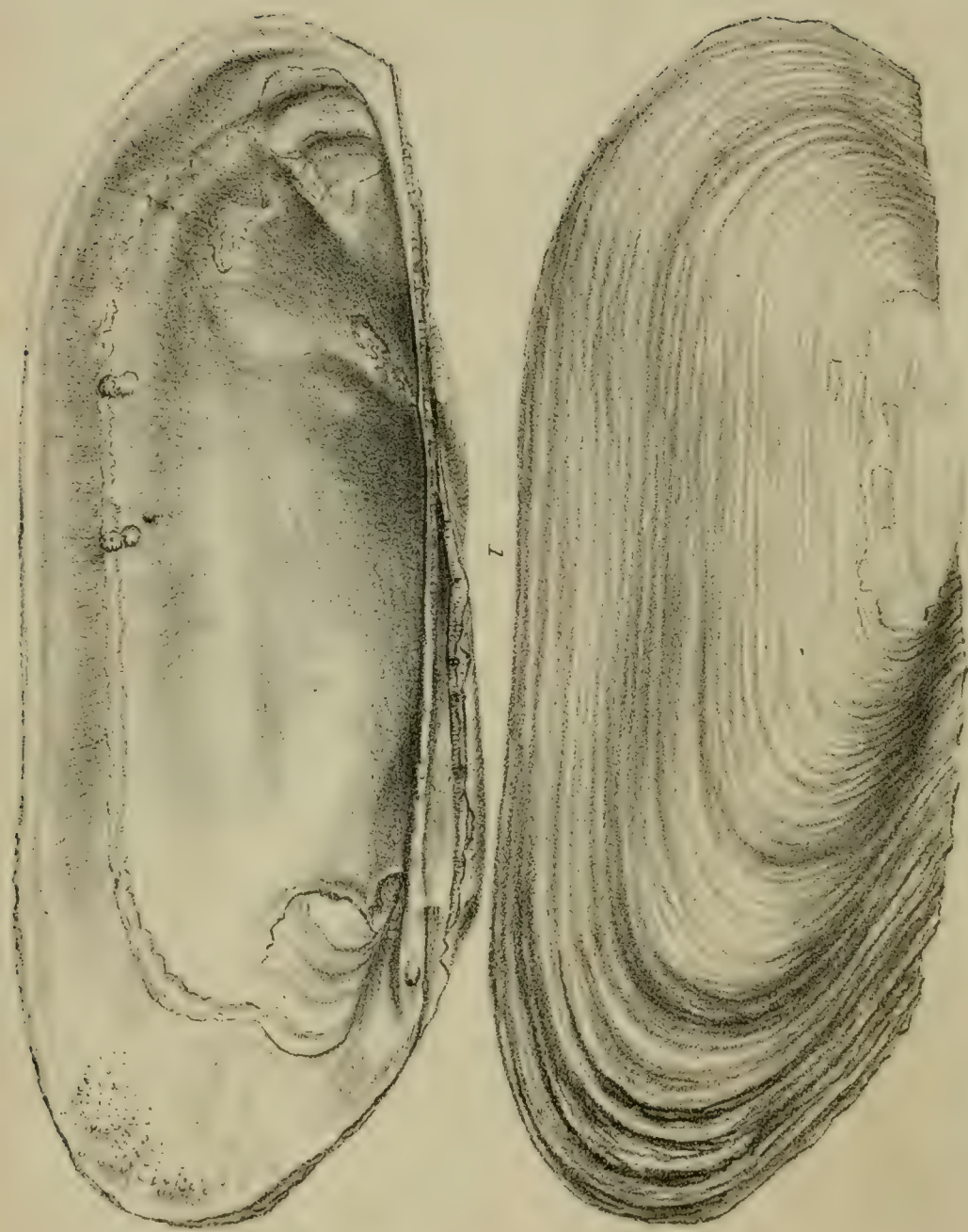
Rosea. E. testâ ovatâ, cancellatâ, epidermide fusco indutâ, intus roseâ ; vertice acuto, valde recurvo vel subinvoluta ; margine fisso.

This shell is readily distinguished from *E. Fissura* by the greater curvature of the apex, by being at least as high as it is long, and by the delicate rose colour of the inside in the adult. There is a white line within the shell, running from the fissure to the apex, formed by the gradual obliteration of the fissure, as the shell is increased. The animal does not appear to differ from that of *E. Fissura*.

Found in Poole harbour, where I took three specimens of different sizes, last autumn, in dredging. *Plate 4. fig. 1.*

1





ART. V. *Description of a new species of IRIDINA.*IRIDINA NILOTICA. *D'Audebard.*

I. testâ crassiusculâ, transversim elongatâ, anticè attenuatâ; posticè productâ, latiore; margine cardinali subarcuato edentulo, sub umbonibus irregulariter et obsoletè subundulato: margine basali sub-emarginato. Tab. 2.

Diam. 1·6. Length 2·1. Breadth 5·6.

From Senaar. Mr. Cailliaud.*

In general form the present shell very closely resembles *I. elongata*, figured in Sowerby's *Genera of Shells*, No. 7, but its hinge margin is not crenulated or dentated. Our specimens of this valuable shell were sent to England by the learned author of the *Mollusques terrestres et fluviatiles*.

Shell rather thick, transversely elongated, anterior side attenuated, posterior produced, broader; hinge line rather arched, without teeth, obsoletely and irregularly undulated beneath the umbones: base slightly emarginate.

* See Bulletin general des annonces et des nouvelles scientifiques, 10th livr. p. 45.

ART. VI. *Some observations on the Lamarckian Naiades,* and the propriety of uniting them all under one generic name.* By. G. B. SOWERBY, F. L. S.

The difficulty of ascertaining to which genus of Lamarckian *Naiades* certain species belong, arises from the very general similarity in form, colours, eroded umbones, compound muscular impressions, and also in the structure and habits of the animals which inhabit them: in fact, an examination of a sufficient number of species will prove that no dependance can be placed upon the characters by which authors usually attempt to discriminate

* *Naiades*, a term used in Botany, and therefore, perhaps, not convenient in Zoology.

between these genera, and that the transition from one to another is so gradual in some instances, and so strongly marked in others, that it is not surprising that authors who having only met with certain species, and not being aware of such intermediate links, should have considered them as the types of new genera. That this has been the case with Lamarck's *Iridina*, is abundantly proved, as we think, by the species which we have published in the present number, which being destitute of the remarkable crenulations that according to Lamarck form the principal character of that genus, should have been considered as an *Anodon*, did it not possess all the other peculiarities of Lamarck's *Iridina exotica*, and of our *I. elongata*. Such characters should not therefore be elevated to the rank of generic distinctions. *Alasmodonta** of Say, *Dipsas* of Leach, *Hyria* and *Castalia* of Lamarck, are all separated from *Unio*, as we are about to demonstrate, upon characters of no more importance, because upon such characters we should be warranted in raising almost every strongly marked species into a genus.

It is remarkable that all the authors we have consulted have observed how nearly related all the genera that have hitherto been formed of the *Naiades* are, and also the similarity of their animals; Lamarck particularly observes that the *Anodontes* are so nearly related to the *Uniones* that they could not be distinguished except by the characters of the hinge; but we shall see that there are *Naiades* not only without teeth, as *Anodon*; with a crenulated hinge line, as *Iridina*; with wings and elongated hinge teeth and lateral teeth, as *Hyria*; and with short hinge teeth and lengthened lateral teeth, as *Unio*: but also that there are others, with small undulations at the hinge, (*Unio Anodontina* Lam. *Anodon rugosus* Swains.) intermediate between *Anodon* and *Unio*: with scarcely any appearance of crenulations along the hinge line, (*Iridina Nilotica*) intermediate between *Anodon* and *Iridina*: with hinge teeth only, (*Alasmodonta* of Say and *Unio glabratus*? Sow.) intermediate between *Unio* and *Anodon*: with a large wing and no teeth, (*Anodon alatus*, Sow.) between *Hyria* and *Anodon*: with a wing and short hinge teeth, (*Unio alatus auct.*) between *Unio*

* More correctly *Alasmodon*.

and Hyria: with two wings and a lamelliform tooth on each side the umbo, (*Dipsas* of Leach) between Anodon and Hyria: and with lateral teeth and rather elongated cardinal teeth, (*Castalia ambigua*, Lam.) between Unio and Hyria. The same shades of difference occur also in the forms of the shells as well as in their thickness; but in these respects, as well as in the thickness of their hinge teeth, each species appears to be subject to very great variation, for which reason we shall not enter further into particulars. Moreover, we think we have already said enough to prove that unless it be thought wise to elevate each of the peculiar sorts we have mentioned, and many more, into distinct genera, it will be positively necessary to unite them altogether under one generic appellation: we propose *Unio* as equally applicable to all; and we here annex a tabular view of the divisions of the genus as far as our observations have pointed them out; further divisions may probably be found useful in arranging the species, which may arise out of the oblique or straight position of the hinge teeth: and such other characters as are not subject to variation or purely specific.

UNIO.

| | | | | |
|--------------------|---|------------|---|-----------------------------|
| A
without teeth | { | not winged | { hinge line simple | Anodontes, Lam, |
| | | | { slightly crenulated | Irid. Nilotica, Sow. |
| | | | { at the umbones | |
| | | | { crenulated | Iridinæ species, |
| B
with teeth | { | winged | { undulated | { Anodon rugosus, Sw. |
| | | | | { Unio anodontina. Lam. |
| | | | | { Anodon alatus, Sw. & Lam. |
| | | not winged | | { A. crassus, Sw. |
| | | | { lamelliform lateral teeth only. | Dipsas, |
| | | | { lamelliform cardinal and lateral teeth. | Hyriæ, |
| | { | winged | { lamelliform lateral and short cardinal teeth..... | Unio alatus, Sw. |
| | | | { lamelliform lateral and nearly obsolete cardinal teeth..... | Unio fragilis, Sw. |
| | | | { lamelliform lateral & short cardinal teeth | Unio. |
| | | | { lamelliform lateral & long cardinal teeth. | Castalia, Lam. |
| | { | not winged | { cardinal teeth only. | Alasmodontes. |
| | | | | |

Mysca of Turton is the same as *Unio* of Authors: his *Unio* is synonymous with *Alasmodon* of Say.

ART. VII. *Descriptions, accompanied by figures of several Helices, discovered by T. E. BOWDICH, Esq. at Porto Santo.** By G. B. SOWERBY, F. L. S.

1. *HELIX sub-plicata*; testâ longitudinaliter subplicatâ, subgloboseâ, anfractibus tribus, ventricosis, superioribus minimis, suturis distinctis, aperturâ amplâ, orbiculari, peristomate continuo, paululùm reflexo. Axis. $1\frac{3}{8}$, diam. $1\frac{1}{2}$ unc. Tab. iii, f. 1.

Shell nearly globose, slightly plicated longitudinally, spire rather prominent; volutions three, ventricose, increasing rapidly in size; sutures distinct; aperture large, orbicular, lip continued all round, a little thickened, and scarcely reflected.

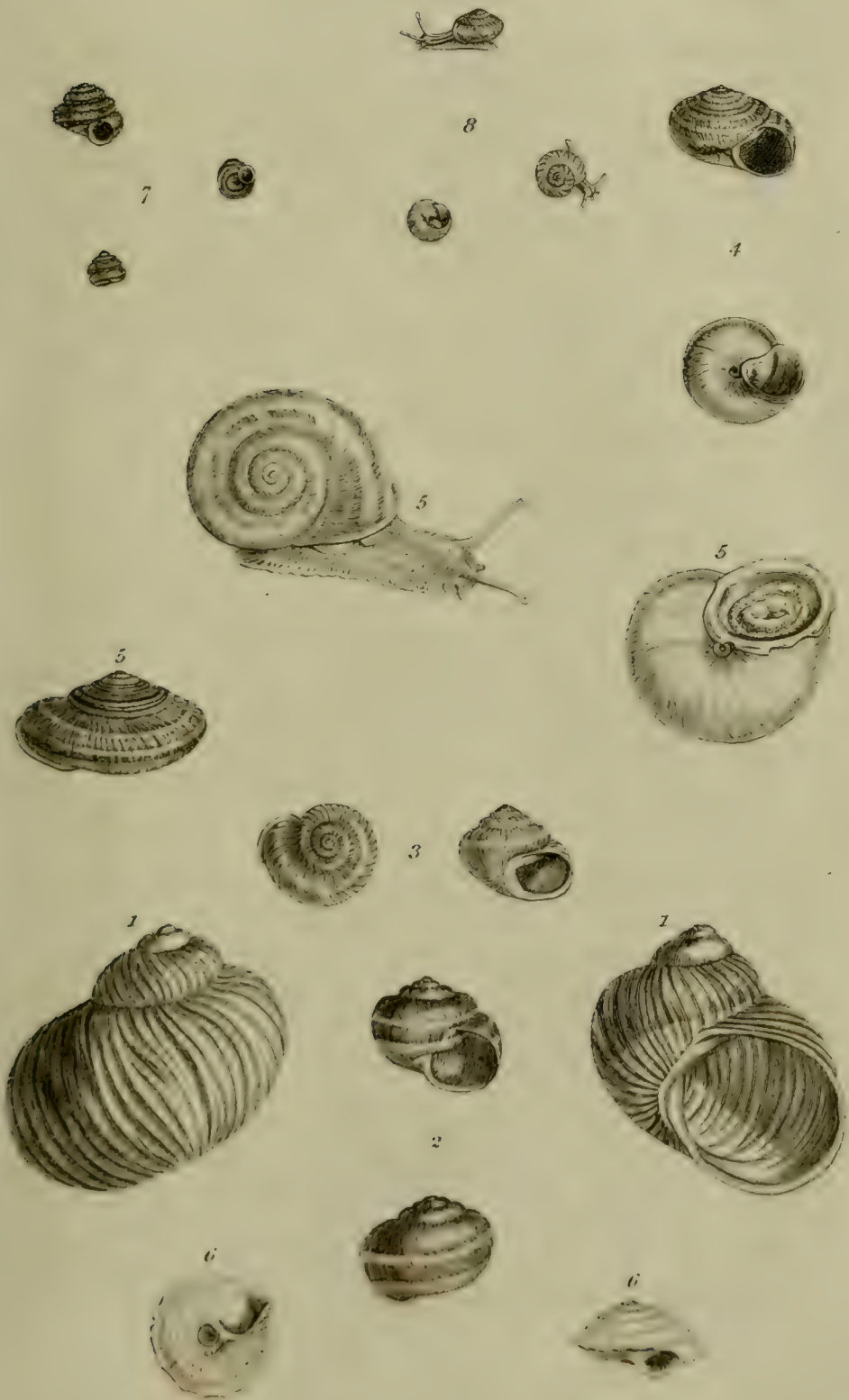
2. *Helix punctulata*: testâ subgloboseâ, spirâ breviusculâ, anfractibus subquinis, ventricosis; suturis distinctis, depressiuculis; aperturâ mediocri, peristomate non continuo, basi reflexo, umbilicum minimum fere tegente; superficie punctulis minutissimis confertis aspersâ. Axis $\frac{1}{2}$, diam. $\frac{5}{8}$ unc. Tab. iii. f. 2.

Shell nearly globose, with a short spire; volutions from four to five, ventricose; suture distinct, rather depressed, forming an indistinct shoulder at the upper part of the volutions; aperture middling, peristome not continued all round, its lower part reflected and nearly covering the very small umbilicus. Shell covered all over with very minute, closely set, raised dots. Colour dull chestnut, the lower part of the last volution and a nearly central band of a brownish yellow.

3. *Helix nivosâ*; testâ subgloboseâ, striis longitudinalibus exilibus ornatâ, spirâ productiore, anfractibus quinis, ventricosis, su-

* In offering to our readers these descriptions and figures, we beg not to be understood as pledging ourselves for the fact of their being all hitherto undescribed. Mr. Bowdich considers them as new: we believe he is correct; and they appear to us interesting, we have therefore to express our thanks to Mr. Bowdich that he has permitted us to make use of them; and also for allowing us to make extracts from his manuscript entitled "Excursions in Madeira and Porto Santo," in our possession. We have examined De Ferussac's magnificent work "Des Mollusques terrestres et fluviatiles," and we certainly do not find engravings of any of the above described *Helices* there. Ed.

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turis distinctissimis; aperturâ orbiculari, peristomate continuo, externo subreflexo, interno incrassato. Axis $\frac{3}{8}$, diam. $\frac{1}{2}$ unc. Tab. iii. f. 3.

Shell subglobose, spire rather prominent; volutions from four to five, ventricose, with numerous slender longitudinal striæ; suture very distinct; aperture orbicular, peristome continuous, the outer part turned a little back, the inner thickened. Pale testaceous with flakes of white.

4. *Helix nitidiuscula*; testâ subdiscoideâ, exilissimè longitudinaliter striatâ, spirâ prominulâ, anfractibus senis, ventricosis, nitidiusculis; suturis distinctis: aperturâ sub-orbiculari, peristomate continuo, simplice; umbilico mediocri. Axis $\frac{3}{8}$, diam. $\frac{5}{8}$ unc. Tab. iii, f. 4.

Shell flattish with a somewhat prominent spire consisting of six volutions, which are ventricose, rather shining, and very finely striated longitudinally; suture strongly marked; aperture nearly orbicular, with a simple peristome; umbilicus not very large. Our specimen is white with 3 brown bands on the upper half of the last volution.

5. *Helix Porto-sanctanae*; testâ ferè discoideâ, umbilicatâ, longitudinaliter striatâ; spirâ subprominulâ; anfractibus quinis, ventricosis; suturis distinctis, aperturâ suborbiculari; peristomate continuo, reflexo, prominente. Axis $\frac{5}{8}$, diam. $1\frac{1}{8}$ unc. Tab. iii. f. 5.

Shell almost discoid, umbilicated; spire rather prominent; volutions five, ventricose, longitudinally striated; suture distinct; aperture rather elliptical; peristome continuous, reflected, prominent. Two varieties in colour are figured, one nearly white, with very light brown bands, and the other tawny with three darker bands. The animal is rather short and of a pale reddish grey colour.

6. *Helix Tectiformis*; testa spirâ brevi, rotundatâ; anfractibus subseptenis, suprâ leviter striatis, medio carinatis, carinâ deflexâ; subtus umbilicatâ subdepressâ, anfractu ultimo rotundato, granulato; apertura elongatâ, subquadratâ, labio subtus expanso, reflexo. Axis $\frac{5}{16}$, diam. $\frac{1}{16}$ unc. Tab. iii, f. 6.

This shell is naturally divided into two parts by the carina of

the middle of its volutions; the upper part or spire is rounded; volutions six to seven, slightly striated; keel in the middle, turned down; lower part umbilicated, rather depressed, volution rounded, granulated; aperture subquadrate, a little elongated: lower part of the lip rather spread and turned downwards.

7. *Helix bicarinata*; testa subglobosa, spirâ breviusculâ, subconicâ; aufractibus quinque quadratis, medianè carinis duabus, superiore obtusiusculâ: aperturâ integrâ, rotundâ, peristomate distincto: umbilico parvo. Axis $\frac{3}{16}$, diam. $\frac{1}{4}$ unc. Table iii. f. 7.

A minute species of a rather globular form, with a shortish, slightly conical spire composed of five squarish volutions, having two central carinæ, of which the upper one is rather obtuse: aperture entire, round, peristome distinct; umbilicus small. The surface is remarkable for being covered with a granular epidermis. This and another minute species which we have represented at f. 8 is common at Porto Santo: the latter shell differs from our *H. bicarinata* in the absence of the keels, and a little in general form—we have not ventured to name it because it so nearly resembles several other minute species that we cannot be quite certain of its characters.

ART. VIII. *Descriptions, accompanied by figures, of several new species of Shells.* By G. B. SOWERBY, F. L. S.

1. *Bulimus iostoma*; Testâ oblongiusculâ, spirâ breviusculâ, obtusâ, anfractibus quinque subventricosis, levitèr striatis, subviolascens-griseis; aperturâ oblongâ, longitudine spiram æquante, intus pallide violaceâ, peristomate incrassato, reflexo, continuo, violaceo: aufractu ultimo parte inferiore intus saturatè castaneo. Axis $2\frac{3}{8}$, diam. $1\frac{1}{4}$ unc. Tab. v, f. 1.

Shell rather oblong, with a shortish, obtuse spire of five somewhat ventricose volutions, of a violet grey colour and slightly striated; aperture oblong, of the same length as the spire, and of a pale violet colour within. Peristome thickened, reflected, conti-



nuous, violaceous : lower part of the last volution within the peristome of a deep chestnut colour.

Only three or four specimens of this shell have been brought to this country, one of which has fallen into our hands. We do not know its locality.

2. *Bulimus goniostoma* ; testâ oblongâ, turritâ, apice obtusiusculo ; anfractibus subsenis, castaneis, longiusculis, subventricosis, ad suturas depressiusculis, superficie eleganter confertissimè granulosâ ; aperturâ oblongâ, utrinque acutiusculâ, ad basim subcanaliculatâ ; peristomate incrassato reflexo, continuo, parte liberâ rubrâ, columellari albâ ; aufractu ultimo ad basim obliquè carinato, umbilicato : umbilicus plicam columellarem internam efformans. Axis $2\frac{1}{2}$, diam. $\frac{3}{4}$ unc. Long. aperturæ $1\frac{1}{10}$ unc. Tab. v, f. 2.

A very bad uncoloured figure of this shell is given in Mawe's Travels in Brazil ; De Ferussac has named it as above, but we do not find a description of it anywhere. From Brazil.

Shell oblong, turrited, point rather obtuse : volutions from 6 to 7, of a chestnut colour, rather lengthened, slightly ventricose, a little depressed at the sutures ; surface elegantly covered with close-set and very minute granulations : aperture oblong, rather pointed at both ends, the base almost formed into a canal : peristome thickened, reflected, continuous ; all the free part bright red ; columellar lip white : last volution obliquely keeled at its base, umbilicated ; umbilicus forming a columellar fold within the mouth.

3. *Bulimus odontostoma* ; Testa turrita, longitudinaliter obliquè striata, striis exilibus, confertis ; anfractibus senis, tribus superioribus minimis, rotundatis, lævibus ; inferioribus subventricosis ; suturis distinctis ; aperturâ sinuosâ, peristomate reflexo, continuo, integro, distincto, intus dentibus octo instructo, tribus in labio externo, tribus, quorum duo connati, in labio columellari, uno in angulo superiore et uno in angulo inferiore : anfractu ultimo bicarinato, carinâ superiore minore, angulum inferiorem umbilici parvi, obliqui, efformante. Axis $1\frac{4}{10}$, diam. $\frac{4}{10}$ unc. Tab. v, f. 3.

A few specimens of this new shell have been sent us from Rio Janeiro, where it appears to be exceedingly scarce.

Shell turritid, with fine close-set, longitudinal oblique striæ; volutions six, the three upper ones small, rounded, smooth; the lower volutions rather ventricose; sutures distinct; aperture sinuous, obtusely angulated above and below, peristome reflected, continuous, entire, no part of it adhering to the last volution, having eight teeth within, three in the outer lip, three, of which two grow together, in the inner lip, one in the upper and one in the lower angle; last volution bicarinated, the upper carina small, forming the lower angle of the small, oblique umbilicus.

4. *Natica patula*; Testa suborbicularis, subdiscoidea, spirâ brevissimâ, anfractibus quatuor, superioribus ferè obtectis, ultimo maximo, supernè rotundato, subtus rotundato-carinato; umbilico patulo, callo columellari spirali, apice planulato: aperturâ magnâ, ultimo aufractu supernè interruptâ, infra obliquè productâ.

A single specimen of this shell has been kindly lent to us by Mr. Millard, of Bristol, who is not acquainted with its locality: we have seen another specimen in Mr. De Ferussac's collection, which was brought from South America by M. De Humboldt.

Shell suborbicular, rather discoid, with a very short spire; volutions four, the upper ones nearly covered, the last very large, rounded above and its lower edge rather keeled, with a very rounded keel; umbilicus spreading, its columellar callus spiral, flattened at its lower end: aperture large, interrupted at its upper part by the last volution, obliquely produced at the lower part.

5. *Melania lævissima*. Testa oblonga acutè conica, anfractibus septenis, convexiusculis, lævissimis, olivaceis, longitudinaliter interruptè fusco-fasciatis; suturis lævibus; aperturâ suboblongâ, supernè acutâ; labio columellari, præcipuè supernè, incrassato.

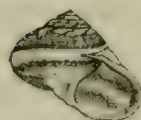
Shell oblong, acutely conical, whorls seven, slightly convex, very smooth, olive green, with interrupted longitudinal dark brown bands; sutures smooth; aperture rather oblong, upper part pointed; columellar lip thickened, particularly at its upper extremity.

This shell was found in abundance adhering to the stones forming the bed of the rivulet (Rio de la Guayra) which runs through La Guayra. Two specimens have been presented to the British Museum, by Dr. N. R. Cheyne.

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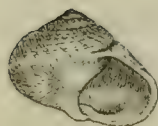
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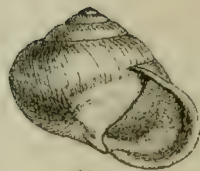
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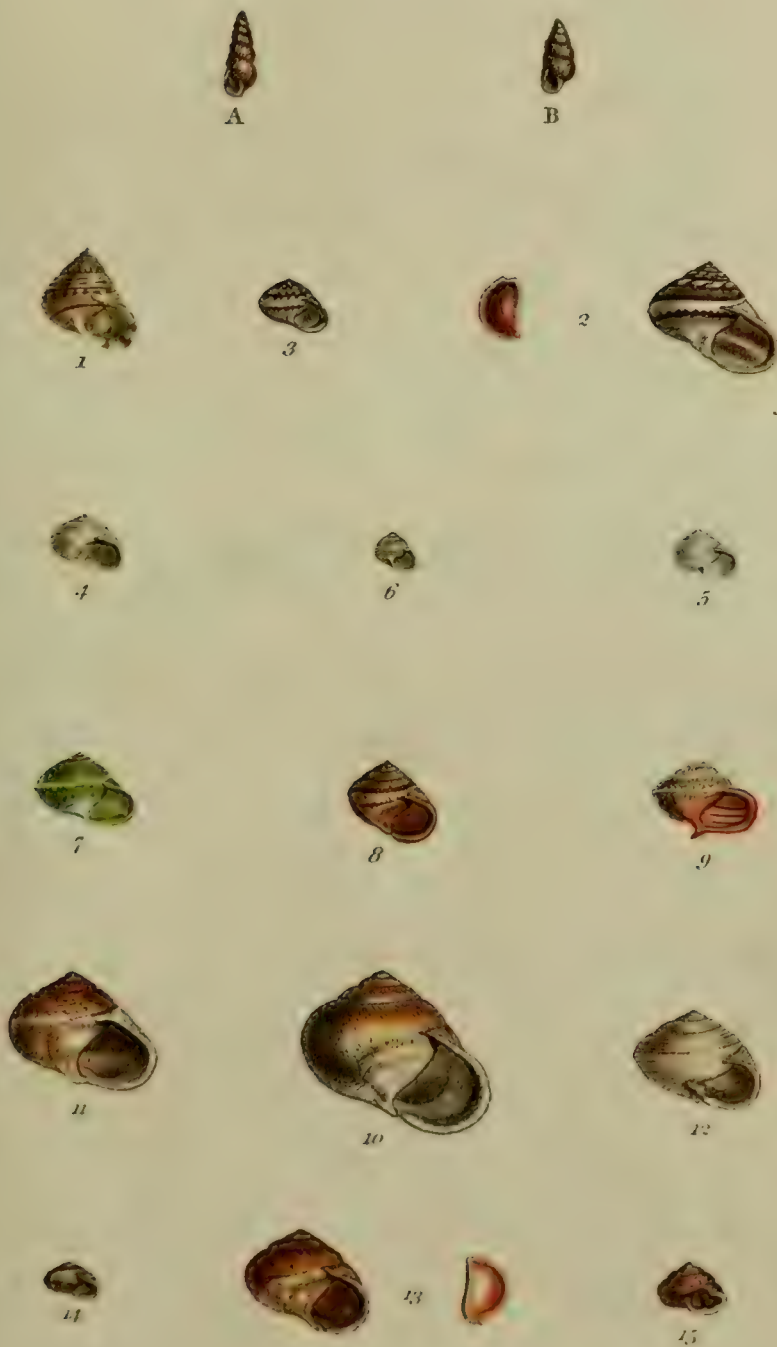


Fig. A. *Balea tridentata*: B. *Balea ventricosa*. p. 61.
 Fig. 1-15. *Helicinae*. p. 251.

ART. IX. On *Balea*, by Mr. JOHN EDWARD GRAY.

ONLY one species of this subgenus has been noticed by De Ferrussac in his Synopsis, where he has placed it in a section with *Turbo elongatus* Chemnitz, ix. 112. f. 956, which differs in having the peristome thickened and reflected like the *Clausiliæ*, but has no teeth or clausium.

BALEA. *Prideaux Mss.*

Testa spiralis turrita, anfractibus numerosis adpressis paulatim majoribus, axe (columella) perforato: *aperturâ* sinistrâ peristomate incompleto, tenui, labiis subuniplicato.

Testâ tenui concentricè obsolete sulcatâ, epidermide fuscâ, lævi.

This subgenus forms a very distinct group in the family of the *Helices* near *Clausilia*, from which it differs in the peristome and want of the *Clausium*.

1. *Balea fragilis*.

Testâ sublineari-ovatâ pellucidâ flavescente.

Turbo perversus, Lin. *Sys. Nat.* 1240. Gmelin.³⁶ *Montagu Test. Brit.* 355. Maton *Lin. Trans.* viii. 181. Dorset. *Cat.* 51. *Turt. Conch. Dict.* 226. Dillwyn *R. S.* 876

Pupa fragilis. Drap. *Moll.* 68

Helix perversa. Ferrussac *Synop.* n. 511.

Balea lucifuga. Leach *Mss.*

Icon. List. An. Ang. t. 2. f. 17? Schroet. *Einl. Conch.* t. 1. f. 5? Favanne, t. 65. f. E. 4. Mont. t. 11. f. 12! *Trans. Lin. Soc.* viii. t. 5. f. 2! Dorset *Cat.* t. 19. f. 11.

Moss at the root of trees, Europe, Great Britain, Mus. Brit. Sowerby, *Nostr.*

Shell spiral, nearly linear ovate, turrited, pellucid yellowish whorles many, obsoletely concentrically furrowed, close pressed, gradually enlarging; columella perforated. Mouth to the left; peristome incomplete, thin, inner lip when perfect with a small pleatlike tooth near the middle, axis $\frac{3}{16}$, diameter $\frac{1}{15}$ of an inch.

2. *Balea Tristensis*.

? *PC W.*, f. A

Testâ subulata ovatâ, fuscâ.

Balea tristensis. *Leach Mss.*

Tristan d' A'Cunha. *Capt. Carmichael. Mus. Brit. Nostr.*

Shell, subulato-ovate reddish brown, axis $\frac{4}{10}$, diameter $\frac{1}{10}$ of an inch.

3. *Balea ventricosa.* *pl. v. f. 13.*

Testâ lanceolato-ovatâ, pallide fuscâ.

Balea ventricosa. *Leach Mss. Brit. Mus.*

Tristan d' A'Cunha. *Capt. Carmichael. Mus. Brit. Nostr.*

Shell, lanceolato-ovate, pale brown, axis $\frac{3}{10}$, diameter $\frac{2}{20}$ of an inch.

ART. X. *Monograph of the Genus Helicina, by Mr. JOHN EDWARD GRAY.*

HELICINA. *Lamarck Sys. but not of De Montford.*

Olygyra. *Say. Amer. Conch.*

Char. dif. Animal unisexuale, capite et disco distinctis, tentaculis duobus contractilibus, oculis subsessilibus, cavitate pulmonali apertâ. Pallii marginibus incrassatis.

Operculo annulato corneo.

Testa spiralis, aperturâ semi-orbiculatâ. Peristomate reflexo columellâ basi callosâ.

Animal head distinct, beak short, apex two lipped. Tentacula two, filiform, contractile, eyes two, nearly sessile, at the outer base of the tentacula.

Respiratory cavity open, lined by the reticulated pulmonary vessels.

Body spiral. Mantle, edge thickened, free, ventral disk, or sucker tongue-shaped, adductor muscle attached to the columella.

Organs of reproduction distinct, the sexes on separate individuals.

Operculum annular, horny or very thin shelly; nucleus nearly central, placed rather towards the innerside.

Shell spiral, depressed, ovate, imperforated, whorls rapidly enlarging, the last one slightly keeled; aperture regular, semi-orbicular. Peristome thickened, reflected, base of the columella callous, slightly pitted, becoming smooth.

History. This genus has been involved in considerable obscurity, as no Linnean author has taken notice of any of its species.

Patrick Brown in his excellent History of the Island of Jamaica, is, I believe, the first person who has mentioned any species of this genus; he describes and figures four, under the name of Cochlea; but he appears to have included and figured *Nassa neritina* as a species of the same genus, and consequently considered it as a land shell.

Sloane in his History of the West Indian Islands, has a figure, which may perhaps belong to this genus, but like most of his other figures, it is so badly executed, that there is no certainty to which species or even genus it belongs.

Lister has two figures, which appear to be referable to this genus, but they both appear to be the same species, at least, it is very doubtful to what species the figure quoted by Lamarck is to be referred, if it is not the same as the other. Lamarck in his *Systema*, took notice of the above mentioned figure of Lister and formed a genus of it; in his *Histoire* he has added the description of four species, one of which has not fallen under my notice.

Say, on the article Conchology, published in the American edition of Nicholson's Encyclopædia, has described another, which I have not seen. Ferussac has noticed and figured a very remarkable species, under the name of *Helix Aureola*, which must have arisen from his only having observed dead discoloured individuals, for some of our specimens have the opercula, which is the first time that a shell with a dentated aperture has been found operculated; the species described in Brown, he appears never to have seen, as he places them in his catalogue of unknown species. We have described sixteen species.

This genus should be placed near to *Cyclostoma*, as both genera have the same kind of animal, except that, as de Ferussac observes, this has the edge of the mantle thickened and formed

into a collar, which is not the case with *Cyclostoma*, and they appear to form a family, intermediate between the *Helicidæ* and *Turbinidæ*; it seems to be connected with *Cyclostoma* by means of *C. patulum*; which has a rather semiorbicular mouth, and an horny operculum apparently spiral.

In consequence of Lamarck refering only to Lister's figure, which has not been taken notice of by any preceding conchologists, most of the English collectors, and even De Montfort, have considered the *Trochus Vestiarus*, Lamarck's *Rotella*, as the type of this genus.

Say, the best of the American conchologists, was not aware of its existence, and therefore formed a new one under the name of *Oligyra*, for a shell that certainly belongs to this, although I have not seen it. Dr. Leach appears to have been equally ignorant of what Lamarck meant, as in his progress of Zoology, published in Thomson's Annals of Philosophy, he does not observe that Say's and Lamarck's genera were synonymous: but refers the latter to the family *Auriculadæ*, most likely accidentally; and De Ferrussac, who frequently quotes Say's work, does not take any notice of the synonym in his *Tableau systematique*.

Division.—It may be divided into five sections, which are partly artificial; but there are certainly many other species as yet undescribed:—

Peristomate edentulo.

**integro*

***postice subaculeato*.

****postice emarginato v. fisso*.

Peristomate sinuato.

*****columella basi callosa*.

Peristomate dentato.

******columella basi concava*.

Shell. Peristome reflected, toothless, entire, operculum not appendiced.

1. *Helicina pulchella*.

Testa (subgloboso-conoidea) lutea, interrupte rufo-tri-fasciata, supra conica, spiraliter albido-rugosa, infra convexa, spiraliter striata,

albida bifasciata, peristomate tenui, reflexo, albo, rufo trimaculato, labio subincrassato, operculo testaceo.

West Indies, Mrs. Gray. *Mus. Brit. Sowerby, Nost.*

Shell yellowish, with three interrupted and sometimes obscure reddish bands; above conical, with white rugose spiral lines, whorls rather convex; beneath convex, spirally striated, with two interrupted white bands. Peristome thin, reflected, white, the outer lip much extended, with three reddish spots where the bands end, the under lip slightly thickened; operculum very thin, shelly, polished; axis $\frac{4}{10}$, diameter $\frac{5}{10}$ of an inch.

2. *Helicina neritella*.

Testa lævis (depresso-ovata) albida, fusco-bifasciata, supra conica, purpureo-fasciata vel marmorata, subtus convexa; peristomate incrassato, reflexo, luteo, columellâ labiisque callosis, luteis; operculum corneum.

Helicina neritella. *Lamarck Hist.* vi. 103.

Lister Conch. t. 61, f. 59. t. 74, f. 73, *junior*, peristomate tenui, columellâ luteâ, foveolatâ. West Indies, Barbadoes. *Lister*.

Shell depressed ovate, smooth, whitish (or lilac) with two narrow brown bands; above conical, variegated or banded with purple; whorls, scarcely convex; beneath rather convex, peristome thickened, reflected, yellow, columella and inner lip thickened, yellow, inside white with purplish bands, operculum horny, brown with a white shelly edge on the inner side; axis $\frac{9}{20}$, diameter $\frac{7}{10}$ of an inch.

When young it is entirely purplish, with a few obscure darker bands, the lips are thin, and the columella is callous, yellow, with a small pit; when bleached the shell is white with two dark bands.

This appears, from its yellow columella, to be the species described by Lamarck, but his character is very obscure; like most of the genus, it varies greatly in size.

3. *Helicina fasciata*.

Testa depresso-ovata, albida, lævis, tenuis, pellucida; supra convexa, interruptè rufo-fasciata; subtus sub-convexa, rufo lineata, peristomate incrassato, reflexo, albo, columellâ labiisque callosis, albis; operculo corneo.

Helicina fasciata. Lamarck *Hist.* vi. 103.

West Indies, Porto Rico. *Maugé. Mus. Nost.*

Shell depressed ovate, whitish, smooth, thin, pellucid; above convex, with a broad interrupted reddish line, beneath rather convex, with a narrow red line near the upper part. Peristome thickened, white, slightly reflected; columella, base and inner lip thickened, white; inside whitish. *Operculum* thin, horny, polished; axis $\frac{2}{10}$, diameter $\frac{3}{10}$ of an inch.

4. *Helicina substriata*.

Testa depresso-ovata lutescente-albida, subcarinata, supra convexa, distanter spiraliter substriata, subtus subconvexa, lævis; Peristomate incrassato, reflexo (albido?) columellâ labiisque incrassatis, callosis, (albidis?)

Cochlea n. 14. *Brown Jam.* t. 40, f. 4? West Indies. *Mus. Nost.*

Shell depressed ovate, yellowish with a white keel-like band on the centre, above convex, with a few distant spiral striæ, beneath rather convex, smooth; the peristome thickened, reflected, columella and inner lip callous (white?)

I have only one specimen of this shell, which is perfectly distinct from all the rest, it appears to be rather worn and bleached, so that the peristome may be yellow, and the striæ more distinct, when perfect.

5. *Helicina Braziliensis*.

Testa depresso-ovata (albida?) spiraliter striata, et minutè concentricè cancellata, supra et subtus convexa; peristomate subincrassato, labiis subincrassatis, columellâ basi excavatâ, carinatâ.

Brazil. *Mr. G. B. Sowerby.*

Shell depressed ovate, (white?) spirally striated, cancellated with minute close concentric striæ, spire convex, beneath rather convex, peristome slightly thickened, reflected, inner lip slightly thickened, the base of the columella with a triangular sharp-edged excavation.

Mr. G. B. Sowerby has shewn me many specimens of this shell, and they all agree in the form of the base of the columella, or I should have been inclined to consider them as the young of some other species.

6. *Helicina costata*.

Testa depresso-ovata, lutea, spiraliter striato-costata, spirâ conicâ, subtus subconvexâ; peristomate incrassato subreflexo, luteo, labiis subincrassatis.

Shell, depressed ovate, yellow, spirally rib-striated, ribs convex, those of the upper part broadest, becoming smaller and closer near the columella, spire conical, acute, beneath subconvex, peristome slightly thickened and somewhat reflected, yellow; the inner lip slightly thickened, columella scarcely callous; axis $\frac{3}{20}$, diameter $\frac{2}{10}$ of an inch.

7. *Helicina viridis*.

Testa depresso-ovata, angulata, carinata, viridis, nitida, lævis, tenuis, carinâ albido-luteâ, spirâ convexâ; subtus convexiusculâ, peristomate luteo, reflexo, subincrassato, labiis tenuibus; columellâ basi callosâ, albâ.

Helicina viridis. Lamarck, *Hist.* vi. 103.

Saint Domingo, Lamarck. Cuba, G. B. Sowerby. Mus. Sowerby, Goodall.

Shell depressed ovate, angularly keeled, thin, polished, green, the keel whitish yellow, spire convex; beneath rather convex, the peristome scarcely thickened, reflected, yellow, inner lip scarcely visible, very thin, base of the columella callous, white; axis $\frac{6}{20}$, diameter $\frac{11}{20}$ of an inch.

This beautiful shell appears to be a perfect specimen of the one described by Lamarck, but is much larger.

** *Peristome reflected, columella callous, aperture behind subspinose or sinuated, operculum simple.*

8. *Helicina aurantia*.

Testa sub-depressio-ovata, subglobosa, lævis, albido rufescens, unifasciata; peristomate incrassato, reflexo, aurantio; columellâ callosâ; aperturæ angulo columellari subtuberculato.

West Indies.

Shell rather depressed ovate, somewhat globular, purplish white, with a narrow reddish brown band a little behind the centre, so as to revolve near the suture of the spire, and sometimes a few faint reddish lines near the base of the columella, peristome thickened, reflected, orange red, inner lip slightly thickened, the

angle of the aperture next the columella callous, produced into a small tubercle ; axis $\frac{3}{10}$, diameter $\frac{4}{10}$ of an inch.

9. *Helicina rhodostoma*.

Testa subdepresso-carinata, punctulata, albida, rufescente marmorata, carinâ albidâ ; peristomate incrassato, reflexo, rufo-aurantiaco ; angulo columellari producto, spinoso ; columellâ callosâ.

Guadaloupe. *Mus. J. Sowerby*.

Shell rather depressed, conical, keeled, minutely punctulated and scratched, whitish, marbled with brownish, the keel white, sharp, peristome thickened, especially in the hinder part, much extended and reflected, of a fine reddish orange, slightly produced in the front part close to the columellar angle into a sharp recurved spine, the columella is callous and of the same colour as the lips ; axis $\frac{2}{8}$, diameter $\frac{1}{2}$ an inch.

*** *Peristome reflected, simple, columella callous, aperture with a groove and notch or slit at the columellar angle. Operculum horny with a process that fits into the groove.*

10. *Helicina major*.

Testa depresso-ovata subglobosa, fuscescens, lævis, spirâ convexâ ; subtus convexiuscula pallida, peristomate incrassato, albo, reflexo ; angulo columellari obtusè emarginato ; labiis incrassatis pallidis.

———— *Mus. Sowerby*.

Shell depressed ovate, nearly globular, brownish, smooth, spire convex, upper part purplish, front rather convex, pale, the peristome thickened, white, reflected, with a slight blunt notch near the columellar angle, the inner lip thickened, convex, pale ; axis $\frac{1}{2}$, diameter $\frac{3}{4}$.

Differs from the following by the lip being more reflected, and the whorls rounder and smooth.

11. *Helicina submarginata*.

Testa depresso-ovata obscurissimè carinata, albido-fusca, concentricè substriata, spirâ convexâ, distanter spiraliter substriatâ ; subtus convexiuscula lævigata, peristomate subincrassato parum reflexo, labiis subincrassatis ; aperturæ angulo columellari subemarginato.

Shell depressed ovate, very obscurely keeled, whitish brown, rather darker above, concentrically striated, spire convex, very

slightly and distantlly, spirally striated; beneath rather convex, smooth; peristome slightly thickened, and scarcely reflected, inner lip thickened, angle of the aperture next the columella with a slight notch; axis $\frac{5}{10}$, diameter $\frac{7}{10}$ of an inch.

12. *Helicina unifasciata*.

Testa subdepresso-ovata, obscurè, acutè carinata, albida, fusco unifasciata, spiraliter subcostata, striata; spirâ convexâ, conicâ, subtus convexâ; peristomate incrassato reflexo; aperturæ angulo columellari obtusè emarginato.

Shell rather depressed ovate, whitish, with a rather sharp keel-like ridge, and narrow brown band round the centre of the last whorl spirally; rather rib-like striated, the striæ convex, rather distant; spire conical convex; beneath convex, the peristome thickened, reflected, the columellar angle of the aperture with a blunt notch; axis $\frac{9}{20}$, diameter $\frac{6}{10}$ of an inch.

13. *Helicina Brownii*.

Testa depresso-ovata, pallide fusca, lævis, pellucida, supra convexa, subtus convexiuscula, peristomate incrassato, reflexo albo; columellâ labiisque subincrassatis, albidis, aperturæ angulo columellari fisso; operculo anticè appendiculato, corneo.

Cochlea, n. 11. *Brown Jam.* t. 40, f. 1.

West Indies, Jamaica. *Brown. Mus. Brit. Sow. Nostr.*

Shell depressed ovate, pale brown, smooth, pellucid, above convex, beneath rather convex, the peristome thickened, reflected, white, the columella and inner lip whitish, slightly thickened, the front part of the aperture near the columellar angle with a (spirally) curved slit. *Operculum* horny with a process fitting the slit.

This very curious shell might, at first sight, appear to form a different genus, but the shape of the aperture of the former sections, shews that the separation would be unnecessary and unnatural.

**** *Peristome reflected, sinuated; columella callous at the base, operculum simple.*

14. *Helicina depressa*.

Testa depresso-ovata, pelluida, fusca, tenuissima, spiraliter et concentricè striata, supra subtusque convexiuscula; peristomate

reflexo, incrassato, albo; columellâ partim callosâ, labiis tenuibus, posticé subunidentatis.

West Indies. Mountains, woods. *Mus. Nost.*

Shell very depressed, ovate, pellucid, brown, very finely spirally and concentrically striated, above and below rather convex. Peristome thickened, reflected, white, with two sinuations where the teeth are in the next section, base of the columella covered over, but not convex: inner lip thin, with a small tooth at the back angle of the aperture. Axis nearly $\frac{3}{20}$, diameter $\frac{5}{20}$ of an inch.

***** *Peristome reflected, two-toothed: base of the columella concave, imperforate; operculum simple.*

15. *Helicina aureola*.

Testa depresso-ovata, spirâ conicâ, subtus subconvexâ, fuscâ, spiraliter striata, striis albidis, rugosis. Peristomate reflexo, incrassato, albo, bidentato; columellâ basi concavâ.

Cochlea n. 12. *Brown Jam. t. 40, f. 3.*

β. excoriata. Testa aurantia vel flava.

Helix aureola. *Ferrussac Hist. de Moll. n. 90, tab.*

Shell depressed ovate, spire conical, beneath rather convex, brown, finely spirally striated, striæ white, rugose, transversely subplicate, peristome thickened, reflected, white, with two teeth, one in the *front* and one at the *base* of the aperture, base of the columella concave, imperforate; axis $\frac{5}{20}$, diameter $\frac{3}{10}$ of an inch.

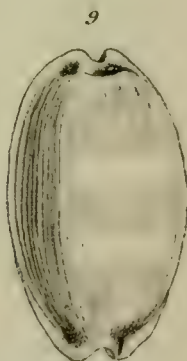
This shell is brown when complete, but when the epidermis is worn off it becomes orange or pale yellowish, according to the degree of bleaching to which it has been exposed.

The following species, which certainly belong to this genus, I have not seen, and therefore have copied their descriptions from the work in which they are mentioned.

16. *Helicina orbiculata*.

“Shell, sub-globular, spire not prominent, but more than convex, lateral line somewhat convex, whorls five, obsoletely striated across, regularly rounded; colour, pale greenish, yellowish, or slightly tinted with reddish, particularly on the body, and margined above by an obsolete white line, on the middle of the body a white vitta revolves, sometimes obscure or wanting, aper-





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|---|----------------|---------------------------|----|----------------|-------------------------|
| 1 | <i>Cypraea</i> | <i>lentiginosa</i> , n. | 6 | <i>Cypraea</i> | <i>arenosa</i> , n. |
| 2 | _____ | <i>albiginosa</i> . | 7 | _____ | <i>controversa</i> , n. |
| 3 | _____ | <i>turdus</i> . | 8 | _____ | <i>maculata</i> . |
| 4 | _____ | <i>arabacula</i> , n. | 9 | _____ | <i>pulchella</i> , n. |
| 5 | _____ | <i>sulcicinctata</i> , n. | 10 | _____ | <i>picta</i> . |



ture acute above, regularly rounded at the base, and extending from the centre of the revolutions or base of the column, to an equidistance between the base and apex of the spire, base of the columella slightly projecting into an obtuse angle, exterior lip whitish, reflected, length $\frac{1}{2}$ of an inch.

“Animal pale, rostrum and tentacula blackish, operculum simple, not spiral, yellowish brown, minutely granulated.”

Oligyra orbiculata. Say Jour. Acad. Nat. Sci. p. 283. Amer. Conch.

East Florida. Say.

Helicina striata.

Testa depresso-ovata, tenuis, subpellucida, obliquè striata, albidâ; columellâ lutescente, labro margine subreflexo. Lamarck Hist. vi. 103.

Porto Rico. Maugé. Diameter five lines.

ART. XI. *Monograph on the Cypræideæ, a Family of Testaceous Mollusca; by Mr. JOHN EDWARD GRAY.*

CYPRÆIDÆ.

Concha. Martial. Concharum Veneris pars, Lister Conch. Porcellana. Gualtier. Martini.

Cypræarum et Bullarum pars, Linn. Partie des Buccinoidés, Cuvier. Partie des Siphonobranches, Dumeril. Goldfuss. Partie des enroulées, Lamarck. Partie des apomastomes enroulées, Ferussac. Angyostomes involvés, Blainville.

CHAR. DIF. Animal, unisexuale, capite et disco distinctis. Tentaculis duobus conico-subulatis, oculis sessilibus; branchiis pectinatis, pallio margine reflexo; operculo nullo. Testâ non symmetricâ subinvolutâ demum corticatâ. Aperturâ elongatâ, lineari extremitate utraque canaliculatâ.

ANIMAL unisexual, head distinct, tentacula two, conical, awl-shaped, eyes two, sessile, at the external angle of the base of the tentacula.

Respiratory cavity open, over the back of the neck; gills in a

longitudinal comb-like series on the inside of the columella or left side of the mantle, edge of the mantle forming a short siphon at each end of the aperture of the shell.

Mantle, edges enlarged, wing-like, reflected over the back of the shell and depositing its last coats, the lines of union of the reflexed portions forming the dorsal line of the shell.

Ventral disk or sucker tongue-shaped, adductor muscle attached to the columella. Operculum, none.

SHELL, oval or oblong, becoming covered with a fine, shelly, highly polished, or variously striated coat, deposited by the reflexed lobes of the mantle, leaving a dorsal line or groove.

Shelly cone, whorls very rapidly enlarging, revolving nearly on the same plane, so as to exhibit none, or only a small, concave, flat or convex spire.

Aperture longitudinal, with a channel or groove at each end. *Inner lip* flattened or rather concave in front, smooth or becoming plaited, *outer lip* becoming involute, thickened, plaited.

The shell alters its appearance considerably, according to the age of the individual, and exhibits three very distinct stages. In the young or first stages, which are figured in *Ency. Method.* t. 349, f. a. b. *Mus. Gotwald*, viii. t. 53, b. e. 65, a. f. 66, a. c. the shell is generally smooth, of a plain greyish colour, or with three longitudinal bands, and the upper part of the *inner lip* is smooth, convex, the lower part flat or concave; the *outer lip* thin. In the second stage, the shell begins to assume more the character of the genus, as the outer lip begins to be inflected or rather thickened, and approaches nearer the perfect appearance of the species as the second coat of colour is deposited; but differs from it in the want of thickness of the shell and the spire being more distinct, and in the want of the dorsal line, which is usually distinct in the third or perfect state, where the last coat has been deposited, and the aperture is more plaited on both sides.

The colouring, or at least, the disposition of the colouring here, is a much more certain characteristic of species, than either the general outline of form or size, the latter of which is exceedingly various. In this family I have often observed full-grown specimens of *C. arabica* from one to three inches long; this peculiarity

is attempted to be explained by Lamarck and others, who assert that when the animal has formed a complete shell, as it has not the faculty of enlarging its size, it is obliged to quit its shell and form a new one, in the same manner as the Annulosa cast their skins, and by that means the same animal forms many shells; but I believe there is not the slightest ground for this notion, for these several reasons; 1. If it happens in this genus, it certainly should do so also in several of the other genera, as the Strombi and Pterocerata, where the mouth is fully formed in the small shell, and there is no appearance of varices in the large specimens. 2. The muscular attachment of the shell to the animal, is one of the best conchological characters that distinguish this class of animals, from the shelly and sandy cases of the Annulosa; as the *Dentalia* and *Sabellæ*, where the animal can withdraw themselves at pleasure; but in the Mollusca I do not think it possible to be done, but by such force as would destroy the individual. 3. There is no analogy between the *crust* of the *crustacea* and *Annulosa*, and the *shells* of *Mollusca*, so that it is false reasoning to judge of the possibility of one from the other.

History. — *Rondeletius* mentions 4 species. *Gesner* 2. *Aldrovandus* 13. *Linneus* 51. *Gmelin* 126, many of which are twice and three times over, *Dillwyn*, *R. S.* 81. *Lamarck. Ann. Mus.* 96. *Hist.* 98.

Geographical Distribution.—They are common to the old and new continent, but generally confined to the warmer climates; there are but six or seven species found in the European seas.

Affinity.—This family appears to be allied to the sub-family *Cassideæ* amongst the *Buccinoideæ*, by means of the *Cassis Testiculum*, of which Lamarck observes, “ce casque a un peu l’aspect de certains Cypræa;” but the affinity is not slight, for in the shape and form of the aperture, which has a groove or canal at each end, both of the lips plaited, and the front part of the columella flattened it accords with those Cypræa; but the outer lip is not inflected, nor is the back of the shell covered with a china-like coat, but with epidermis, and the canal in front of the aperture is recurved. The *Ovulæ* on the opposite side the family, have certainly great affinity to the *Bullideæ*, as is pointed out by Linneus, who

places them all in that genus, but *Bulla* differs most essentially from them; in the animals by the position of their branchiæ, and their being half hermaphrodite, and in the shell by the aperture being rounded and quite entire at each end, and the edges not being thickened, nor the back covered with a shelly coat, for the shell is here covered with the soldered reflected lobes of the mantle; the connection is most apparent by means of *Ovula patula* and *Bulla Naucum*, in the latter of which there are some slight appearances of a curved canal at each end of the aperture, as in the character of the Cypræideæ, but it has not the enamelled back.

This family has some analogy in their polished coats, first, to the *Marginellæ*, which induced Montagu to call a species of that genus, *Cypræa Voluta*; and indeed such is the affinity between the young of this species, which has been called *Bulla diaphana*, that Dillwyn has considered it as the young of *C. Europea*; in which Montagu also appears to have coincided, until he observed a totally different construction in the animal; but I believe that *M. persicula* is the most analogical species of this genus; and secondly to the *Olivæ* which differ essentially in having an operculum, and all the characters of the *Buccinoideæ*.

The natural arrangement of this family into sections, I almost despair of, for I have had most of the species lying before me, and have examined them day after day for a fortnight, but have not yet succeeded to my entire satisfaction. I have placed them as well as I can for the present, and shall therefore, if I am fortunate enough to discover a better arrangement, lay it before the public; doubtless when further discoveries in this extensive genus shall have rendered our knowledge somewhat more perfect, such an arrangement will be more easily attainable; as we observe in the late discovery of a new species, which unites the costated Cyprææ with the Ovulæ, by having the smooth young state, and the costated shelly coat of that division; but differs from them in the want of the thickened, toothed inner lip, which thus supplies the link which was wanting.

This family is divisible into three genera, thus:

CYPRÆA. Shell, when young, polished, inner lip thickened, plaited, outer lip involute-plaited.

CYPRÆOVULA. Shell, when young, polished, inner lip simple, outer lip involute, plaited, back costato-striate.

OVULA. Shell, when young, striated, inner lip simple, smooth, outer lip involute, back polished.

CYPRÆA.

Shell smooth, polished.

*Columella front deeply concave.

**Columella front nearly even.

***Shell, edge above denticulated, columella front even.

****Shell, back ribstriated or tubercled, columella front concave.

*CYPRÆE VERÆ. Shell, when young, smooth, banded; when perfect, polished, smooth, edge entire, columellar front deep, distinctly concave, mostly plaited, aperture rather dilated, concave.

Cypræa Princeps. Testa orbiculato-ovata, gibba, albida, dorso lineolis fuscis ornato, lineâ dorsali centrali, simplici, basi planulato, lateribus rotundatis, gibbis, pallide incarnatis, fusco-maculatis, extremitatibus concentricè fusco-lineatis.

Persian Gulph. Mus. Sowerby.

Shell orbicular, ovate, gibbous, white, back ornamented with variously curved, brown lines; on the upper part of the sides near the centre, are two somewhat square brown blotches, the dorsal line is nearly central, straight; sides rounded, gibbous, pale flesh colour, with various sized brown spots, the extremities margined, rather produced, with several concentric brown lines, base white, rounded, slightly shelving towards the mouth. Teeth of the inner lip small, close; columellar front deep; plaits, of the outer lip rather larger, more distant; whorls partly visible, conical, convex; inside white,—axis 4, diameter 3 inches.

I have only seen one specimen of this beautiful shell, which is called by *Humphrey* the *Brindled Cowry* from the Persian Gulph.

It appears intermediate between the Maps and the Tigers.

Cypræa Mappa.

Testa ovato-elliptica, albida vel flavescens, lineolis fulvis, guttisque albidis sparsis ornata; lineâ dorsali ramosâ; basi planâ; marginibus rotundatis incrassatis, guttatis; dentibus luteis.

a.—Testâ flavescente, lineolis fulvis ornatâ, lineâ dorsali angustâ laterali, lateribus brunneo-subguttatis.

Cypræa Mappa. *Lin. Sys. Nat.* 1173! *Martini* p. 340. *Born. Mus.* 172. *Schroet. Einl.* p. 95. *Gmelin* 3397! *Schreiber's Conch.* 53. *Lamarck Ann. Mus.* xv. 449! *Hist.* vii. 378 *Dillwyn, R. S.* 438!

Icon. Rumph. t. 38, f. B.! *Pet. Amb.* t. 16, f. 2. *Argenville* t. 18, f. B. *Seba* iii. t. 76, f. 3, 13, 17. *Knorr.* t. 26, f. 3. *Favanne* t. 29, f. A. 3. *Martini* t. 25, f. 245, 246. *Ency. Meth.* t. 353, f. 1.

b. rosea. Testâ albâ lineolis brunneis ornatâ, lineâ dorsali latâ centrali, lateribus purpureo-guttatis, fauce aurantiâ.

Cypræa Mappa β. *Born.* l. c. *Sow. Genera!*

Inhabits Indian Ocean. African Seas, *Linneus.* Amboyna, *Rumphius.* β. *Mus.* Sowerby.

Shell ovate, elliptical convex, yellowish, back ornamented with fulvous lines, leaving pale roundish spots, dorsal line branched, sinuated, with brown lunate spots at the side of the spire, the base flat, margin at the sides rounded, at the extremities slightly produced, spotted with brown; teeth yellowish, of the inner lip small, close; columella deep, rather concave, plaited; of the outer larger and more distant; spire visible, conical, convex; inside white; axis 3, diameter 2 inches.

This shell varies considerably in being white, with the lines reddish brown, and the dorsal line broad and placed on the side, the base and sides spotted with purple, the teeth and mouth bright yellow, and the extremities pale violet.

Cypræa arabica.

Testa ovato-elliptica, albida, lineolis fuscis guttisque albidis sparsis ornata, lineâ dorsali simplici; basi incarnata planulatâ; lateribus incrassatis, fusco maculatis, obsoletè angulatis; dentibus fuscis.

Cypræa arabica, *Lin. Sys. Nat.* 1173. *Martini* f. 398. *Schroet. Einl.* f. 95. *Inn. Bau. Conch.* 5. *Schreiber's Conch.* 54.

a. arabica. Testâ lineolis distinctis subrectis fuscis ornatâ.

C. arabica. α. *Born. Mus.* 173. *Gmelin* 3398.

C. arabica, *Lamarck Ann. Mus.* xv. 449. *Hist.* vii. 378. *Dillwyn R. S.* 438.

Icon. List. Conch. 658, f. 3. *Rumph.* t. 38. f. m. *Gualtier*

t. 16, f. v. *Knorr*. iii. t. 12, f. 2. vi. t. 20, f. 2. *Martini* i. t. 31, f. 328. *Ency. Meth.* 552, f. 1, 2.

b. intermedia. Testâ lineolis subconfluentibus fuscis guttisque irregularibus sparsis ornatâ ; laterum angulo eminentiore.

C. arabica β . *Lamarck* l. c.

Icon. *Argenville Conch. App.* t. 2, f. 1. *Tavanne* t. 29, f. 1, A. 2. *Martini* t. 31, f. 330, 331. *Ency. Meth.* 352, f. 5.

c. histrio. Testâ lineolis confluentibus fuscis ornatâ, albido-guttatâ, guttis polygonis ; lateribus incrassatis, nigro-maculatis.

C. arabica. β . *Born.* l. c. *Gmelin* 3398.

Cypræa Histrio. *Mus. Gevers.* 404 *Gmelin* 3403. *Lamarck Ann. Mus.* xv. 450. *Hist.* vii. 379. *Dillwyn, R. S.* 439.

Cypræa Arlequina. *Chemnitz*, x. 110.

Cypræa Reticulata. *Martyn U. C.* t. 15. *Gmelin* 3420 ! (2).

Icon. *List. Conch.* t. 659, f. 3. a. *Rumphius* t. 39, f. R. (2.) *Petiver. Amb.* t. 16, f. 3. *Gaz* t. 53, f. 6. *Knorr.* vi. t. 16, f. 1. *Chemnitz* x. t. 145, f. 1346, 1347.

d. depressa. Testâ subdepressâ, lineolis confluentibus fuscis, ornatâ, albido-guttatâ, guttis rotundatis, regularibus, marginibus tumidis.

Ency. Meth. t. 351, f. 1. a. b.

2. *Junior.* Testâ ovatâ, cœrulescente, sub-4-fasciatâ.

3. *Incompleta.* Testâ ovatâ, glaucâ, testaceâ, undulatâ, subquadri-fasciatâ, lateribus submaculatis, extremitatibus fuscis.

Cypræa amethystea. *Lin. Sys. Nat.* 1174. *Martini* 1. 343. (3.) *Schroeter Einl.* 1. 106. *Gmelin* 3404.

Cypræa fragilis. *Lin. Sys. Nat.* 1174. (4.) *Schroet. Einl.* 1. 106. *Gmelin* 3404.

Icon. *List. Conch.* t. 662, f. 6. (3). *Rumph.* t. 39, f. 2. (3). *Pet. Amb.* t. 16, f. 3. *Gaultier* t. 16, f. 2. (4.) *Knorr.* v. t. 25, f. 5. *Martini* 1. t. 25, f. 247, 249. *Shaw Nat. Misc.* xv. t. 648.

4. *decorticata.* Testâ dorso purpureo basi albidâ nigro-maculatâ ; dentibus fuscis.

List. Conch. t. 679, f. 26. *Knorr.* iii. t. 2.

5. *polita.* Testâ dorso fusco-purpureâ, albido-guttatâ, basi albidâ, nigro-maculatâ.

6. *distorta.* Testâ spirâ longè exsertâ, conicâ.

Inhabits the Indian Ocean, Madagascar, *Lister*. Amboyna, *Rumphius*. Sunda, *Lister*, *Linneus*. Friendly Islands, *Martyn*. *Mus. Brit.* *Sowerby*, *Nostr.*

Shell ovate, elliptical, white ornamented with brown lines, leaving white, more or less angular or orbicular spots, or forming brown reticulations, the dorsal line simple, mostly central, with a brown lunate spot at the side of the spire, edge thickened, roundish angular, white, yellowish, or purplish spotted with black, base flattish, flesh coloured or white, aperture linear, slightly concave, dilated in front, teeth nearly similar, close, rather narrow, brown, columella deep, flattish, plaited; spire conical, convex; inside purplish.—axis 3, diameter 2 inches.

This species varies exceedingly. 1. in size, the following are the measurements of 3 specimens; *a.* axis $1\frac{1}{2}$, diameter $\frac{3}{4}$; *b.* axis $1\frac{4}{10}$, diameter $1\frac{1}{10}$; *c.* axis 3, diameter 2 inches; 2. in shape, being more less margined; and 3. in colour, the lines being sometimes narrow or broad, more or less confluent, they are sometimes so much so in the last variety, that the back of the shell appears brown with white spots as in *C. cribraria*, sometimes obscurely banded.

Cypræa Arabica.

Testa ovata gibbosa, albido-cærulescens obscure quinque-fasciata, lineolis fulvis ornata; basi fulvescente, planulatâ lateribus, incrassatis, angulatis, carneis, atro-rubro-maculatis; aperturâ concavâ dentibus albidis, eminentibus.

Cypræa arabica. *Lamarck Ann. Mus.* xvi. *Hist.* vii. 399.

Cypræa arabica. *Var. Dillwyn, R. S.* 438.

2. *Incompleta.* Testâ cærulescens 3-fasciatâ, basi fulvâ.

Western coast of Mexico, near Acapulco. *Humboldt, Lamarck. Mus. Nost.*

Shell ovate, gibbous, whitish blue, obscurely three banded, ornamented with fulvous brown irregular lines, base flattened, edge and inner side of the aperture concave, pale reddish yellow, margin thickened, angular, with largish black purple spots, extremities above brown, slightly produced. Aperture rather broad, teeth narrow, deep, whitish; columell., base concave, deep, centre smoothish, innermost part plaited, spire visible, conical convex, axis 1 inch, diameter $\frac{6}{10}$ of an inch.

I am not certain that my shell is the same as Lamarck describes, though it agrees with all his characters, for my own has certainly more affinity to *C. Mauritiana* than *C. arabica*. Lamarck observes that the dorsal line is rather branched; in my specimen, which is perhaps not quite so full grown, I cannot observe any. It is instantly to be distinguished from all the other *Cyprææ* by its prominent spire, flat base, and very deep groves between the hinder teeth.

Cypræa Mauritiana.

Testa ovalo-ovata gibbosa flavescens; fulvo-fusco-reticulata, flavido-guttata, basi plana, nigerrima; lateribus incrassatis angulatis, nigris; aperturâ albidâ; dentibus obtusis, nigris.

Cypræa Mauritiana, *Lin. Sys. Nat.* 1176; *Martini* 1, 388, *Born. Mus.* 180; *Schroeter Einl.* 1. 107; *Gmelin* 3407; *Schreiber's Conch.* 1. 63; *Lamarck Ann. Mus.* xv, 449, *Hist.* 377; *Dillwyn R. S.* 447.

Icon. Bonnanni Mus. Kirch. iii, f. 261! *List. Conch. t.* 703, f. 52! *Rumphius t.* 58, f. 2; *Pet. Gaz. t.* 96, f. 8! *Gualtier t.* 15, f. S. T.! *Seba* iii, t. 76, f. 19! *Knorr. i. t.* 13, f. 1! ii, t. 27, f. 5! *Favanne t.* 30, f. F. 2; *Martini i. t.* 30, f. 317! *Ency. Method. t.* 350, f. 2 a. b.!

1. *Junior*. Testâ oblongâ ellipticâ, marmoratâ, subfasciatâ. Peribolâ—*Adanson, tab.* 5, f. 1. *Sow. Gen. Shells* f. 1.

2. *Juvenis*. Testâ ovatâ, gibbosâ, brunneâ, quinque-fasciatâ, undatâ.

Bulla ovata Gmelin 3432.

Bulla Ovum Var. *Schreiber's Conch.* i. 81.

Cypræa Regina Chemnitz x. 101. *Gmelin* 3406. *Schreiber's Conch. p.* 49.

Cypræa turbinata. Gmelin 3404 (1). *Schreiber's Conch.* i. 59.

Cypræa fragilis, Born. Mus. 179 (1).

Cypræa nebulosa, Soland. MSS. 3432. *Portland Catal.*—*Cypræa venerea Gmelin* 3404 (3) *Schreiber's Conch.* i. 60. *Icon. Bonnani Rec. & Kirch.* iii, 262, (2). *Martini* 1, t. 22, f. 207, 208. *Chemnitz* x, t. 144, f. 1335, 1336. *Born. Mus. t.* 8, f. 601. (1). *Sow. Gen. Shells,* f. 2.

2. *Incompleta*. Testâ ovatâ, gibbosâ, brunneâ, fasciatâ, submarginatâ.

Cypræa turbinata, *Gmelin* 3404 (3).

Cypræa tri-fasciata, *Gmelin* 3404 (4). *Schreiber's Conch.* i. 60.

Icon. Lister Conch. t. 675, f. 22. (3). *Knorr.* vi. t. 18, f. 2, (4).

Martini ii. t. 65, f. 726, 727.

3. *decorticata*. Testâ flavescens sub-fasciatâ, basi margineque nigro-fuscâ.

Inhab. Persian Gulph, *Bonanni*. Mauritius, *Lister*. Amboyna, *Rumphius*. Java, *Linneus*. Nussatilla, *Martini*. Isle of France, Indian Ocean, *Lamarck*. *Mus. Brit.* *Sowerby*, *Nostra*.

Shell ovate, above gibbous, pale yellowish, netted with broad brown reticulations leaving orbicular pale spots, base flat, concave toward the aperture, blackish brown, margin thickened, produced, angular, blackish brown except at the ends of the canals which are pale, aperture rather large, pale, front concave, teeth rather large, blunt, dark blackish brown, columella concave rather deep, spire hidden, inside purplish white.

Cypræa stercoraria.

Testa ovata, ventricosa, gibbâ, pallide lutescens, maculis fulvo-fuscis irregulariter nebulosa; Lineâ dorsali sub-irregulari; basi planâ fuscâ; lateribus incrassatis, subangulatis lividis fusco-maculatis; aperturâ fuscâ, dentibus albidis, spirâ fusco-notatâ.

Cypræa stercoraria, *Lin. Sys. Nat.* 1174. *Born. Mus.* 175. *Schroet Einl.* i. 99. *Gmelin* 3399. *Schrieber's Conch.* i, 55. *Chemnitz* xi, 36. *Lamarck Ann. Mus.* xv, 451. *History* vii, 580. *Dillwyn R. S.* 441.

Cypræa olivacea, *Gmelin* 3408 (2).

Cypræa conspurcata, *Gmelin* 3405 (1). *Schreiber's Conch.* i. 60.

Porcellana gibba, *Mus. Gevers* 406.

Icon. Lister Conch. t. 687, f. 34. *Knorr.* iv. t. 13, f. 1. *Martini* i. t. 31, f. 332 (2). *Chemnitz* x, t. 180, f. 1739, 1740. *Ency. Method.* t. 354, f. 5.

b. *Rattus* testâ non gibbosâ, pallidè fusco-nebulosâ.

Cypræa nebulosa, *Gmelin* 3413 (3).

Cypræa n. 107. *Schroeter Einl.* i. 160.

Cypræa Rattus *Lamarck Ann. Mus.* xv. 451. *Hist.* vii. 380.





FIG. 1. A. BEAVER, IN THE ACT OF CHIPPING A WOODEN DAM.



ART. XII.—*Abstract of a "Memoir on a new genus of the order Rodentia, named Capromys."* By M. G. A. DESMAREST.*

The animal which forms the subject of this paper is a native of the island of Cuba, from whence two male specimens were brought alive by M. Marcellin Fournier, who presented them to the author. It is known there by the name of *Utia*, and is with much probability supposed to be the same animal described under that name by Bomare, Oviedo, and other authors. The references to Aldrovandus, Dutertre, &c. are not calculated to throw any light upon the subject, and we therefore pass them over. Bomare observes that "the *Utias* is a species of rabbit of the size of a rat, which inhabits the West Indies, and which is hunted at night, by the light of a luminous insect, named *Acudia*," (doubtless *Elater Noctilucus*, of which M. Fournier brought large quantities from Cuba.) M. Desmarest imagines it to be also the "*Mus maximus, pullus, caudá oblongá, pilosá, dorso subsetoso*," of Brown.

The head is rather long, compressed laterally, and the forehead very slightly arched. The tip of the snout is truncate, higher than it is wide, at the upper part of which are situated the nostrils, which are very open, oblique, wider, and nearer to each other below than at the upper part; their circumference externally and above has a distinct thickened border, and the interval between them is marked by a medial longitudinal furrow, which terminates below in the bifurcation of the upper lip.

The mouth is moderately open; the lower lip somewhat thickened, transverse, and not pointed, as in most of the *Rodentia*.

The upper incisores are not very strong, transversely truncate at the extremity, and not furrowed on the anterior surface; the lower are only slightly subulate and very similar to the upper; the former are yellowish, the others white.

* Translated from the "Memoires de la Societé d'Histoire naturelle de Paris," by Thomas Bell, Esq. F. L. S.

The whiskers are numerous, strong, and generally almost as long as the head.

The eyes, situated very near the line of the forehead, are rather nearer to the base of the ears than to the extremity of the snout. They are moderately large, very little longer than they are high; the eyelids are well formed, and the upper is furnished with very fine, rather long and regular eye-lashes. Before the anterior canthus is a very slight furrow in a direction towards the nose. The cornea is moderately convex; the iris of a deep brown colour, the pupil longitudinal and narrow by day, round at night; the sclerotic greyish.

The ears are nearly one-third the length of the head, they are erect and lateral, nearly naked and blackish; their anterior margin strait, the apex rounded, and the posterior margin marked with a distinct rounded notch.

The neck is short.

The body is somewhat bulky, and like that of most of the *Rodentia*, much thicker behind than before; and the back is generally much arched below the region of the shoulders. The tail, the length of which does not exceed half that of the body and head together, is strait, thick, conical, almost without hair, and covered with numerous scales disposed in rings.

The hinder legs are, in length, intermediate between those of the rats properly so called, and those of the marmots; but they are at least as thick and strong as the latter. The fore feet have four toes, quite separate, terminated by strong arched and sharp-pointed claws; and the rudiment of a thumb, furnished with a small nail, truncate transversely, similar to that in the rats, marmots, squirrels, &c.; the longest toe is that which answers to the middle finger, and the others decrease in the following order: the fourth or ring finger, the index, and the little finger. The hind feet have five toes, formed like the anterior, but longer, broader, and with stronger claws; the thumb, although the smallest, is much detached, and its claw is as strong as those of the other toes; of these the middle is the longest, that on each side very little shorter, and the external is intermediate between these and the thumb. The joints of all the phalanges are readily felt, both above and

below ; the muscles which move them are very prominent, particularly towards the extremity of the toes. A number of transverse furrows are observed which are very apparent on the lower surface, both of the anterior and hinder toes.

The palms and the soles of the feet are naked, black, and as it were shagreened with large grains, somewhat like the rind of the truffle. This structure is continued to the heel on the hind feet, which indicates that the animal is plantigrade ; the heel, however, is a little raised, and touches the ground only by accident in walking gently. The palm has five principal prominences, separated by deep furrows : one of these projections corresponds to the thumb, another, placed externally, forms a sort of heel, a third is at the base of the index, a fourth answers to the middle and fourth toe, and the fifth corresponds to the outer toe. The sole of the foot, growing narrower towards the heel, has, about two-thirds of the length forwards, a very deep transverse furrow, beyond which are four tubercles analogous to those of the fore feet, and similarly disposed ; one towards the inner toe, a second for the following one, a third for the two next, and a fourth for the outer toe. On the shagreened skin of the lower surface of all the feet there is one scale larger than the rest, on the most projecting part of each tubercle, which is somewhat of a hexahedral form.

The nipples, of a brownish colour, situated entirely at the sides of the body, are four in number ; the pectoral or anterior pair being about two inches and a half from the second or abdominal pair.

The anus, situated near the base of the tail, forms a conical, oblong, distinct projection, at the summit of which is the orifice of the intestinal canal, nearly circular, having a raised edge, and marked with fine converging striæ.

The sheath of the penis, in one of the individuals in my possession, is situated one inch before the anus ; in the other, which I believe to be the older, it is much nearer. The form of this sheath is elongate, conical, swollen at the base and pointed at the extremity ; its direction, when at rest, is backwards, and its point almost touches the edge of the anus. The orifice for the escape of the urine is below, and is corrugated at its extremity like the prepuce of a child. The testicles, concealed under the skin, but

slightly apparent, are nearly the size and form of a kidney bean, and have a trifling degree of mobility. The hair with which the animal is covered, is plentiful and generally rough. The extremity of the snout, the edge of the nostrils, and the lips are black, and clothed with an excessively fine short hair. The eyelids are naked and black; as are also the ears, but these are beset with some very fine long hairs of a grey colour. The skin of those parts of the body which are covered with hair, is of a whitish grey; that of the under part of the belly, which is almost naked, is browner. The upper part of the toes, of the metacarpus and metatarsus, which is of a black colour, is covered with scales interspersed with hairs. The under part of the feet is granular, naked and black. The tail is marked with about a hundred and fifty rings, formed of prominent angular scales, which progressively diminish in size from the base to the extremity. Short stiff hairs, in the direction of the tail, appear between these scales, and are more abundant above than below, where they are sooner worn down, by the continual friction to which the lower surface of this part is exposed. The hair of the forehead is directed backwards, and is continued in the older individual into a sort of tuft towards the occiput, which is not the case in the younger. The hair of that part from which the whiskers grow is blackish, and thus forms a very obvious spot of that colour on each side the muzzle.

The hair of the lower part of the forehead, of the corners of the mouth, of the chin, and of the under part of the neck is generally grey; that of the upper part of the forehead, the cheeks, the back of the neck, the back, the flanks and the exterior surface of the limbs, is generally brown; each hair has a ring, more or less broad, of a yellowish colour, towards the extremity, and the extreme point is black. From this mixture results a general tint of greenish brown, of which the yellowish colour is distributed in specks. The hairs on the rump are stiffer than the others, and pass into a reddish brown; and those which are near the base of the tail, are much thicker, hard, rigid, and wholly of a reddish colour.

The bristles which compose the whiskers are very long and nearly thirty in number on each side; some of the largest are

white with a black tip; others are wholly black. There are also some bristles of the latter colour, forming a tuft above the eye, and another between the eye and ear.

The rigid hairs distributed amongst the scales of the tail are reddish, except those towards the extremity which pass insensibly into brown.

The belly and chest are of a uniform dirty brownish grey. The upper part of the feet is in general covered with a blackish brown hair, interspersed with a few scattered, long, white hairs. The older of the two individuals differs from the other, in having the sides of the head, the under part of the neck, the chest and belly of a whitish grey, and some very long hairs of this colour on the upper surface of the feet. In other respects they are almost exactly similar.

DIMENSIONS.

The older individual is the larger of the two by about one ninth. The following are the measurements taken from the younger one.

| | feet | in. | lines |
|---|------|-----|-------|
| Total length from the tip of the nose to the origin of the | | | |
| —— tail | 1 | 0 | 3 |
| Length of the head from the tip of the nose to the occiput. | 0 | 3 | 3 |
| —— of the tail | 0 | 6 | 0 |
| Height of the animal forwards | 0 | 4 | 3 |
| —— behind | 0 | 5 | 0 |
| Circumference of the muzzle below the eyes | 0 | 4 | 0 |
| Circumference of the opening of the mouth..... | 0 | 1 | 2 |
| Distance between the nostrils below | 0 | 0 | 3½ |
| Length of each nostril | 0 | 0 | 3 |
| —— between the point of the nose and the anterior | | | |
| angle of the eye | 0 | 1 | 2 |
| —— between the posterior angle of the eye and the | | | |
| base of the ear | 0 | 0 | 9 |
| Vertical diameter of the eye | 0 | 0 | 4 |
| Distance between the anterior angles of the eyes | 0 | 1 | 3 |
| Circumference of the head, between the eyes and ears.. | 0 | 5 | 6 |
| Length of the ears | 0 | 0 | 11 |
| Width of the base of the ears | 0 | 1 | 3 |
| Distance between the ears | 0 | 1 | 0 |
| Length of the neck | 0 | 1 | 0 |

| | feet | in. | lines |
|--|------|-----|-------|
| Circumference of the neck | 0 | 5 | 0 |
| ———— of the body behind the fore legs | 0 | 8 | 4 |
| ———— before the hinder legs | 0 | 10 | 4 |
| ———— of the tail at the base | 0 | 2 | 10 |
| ———— in the middle | 0 | 1 | 3 |
| ———— 6 lines from the extremity | 0 | 0 | 7½ |
| Length of the fore-arm between the elbow and wrist.... | 0 | 2 | 3 |
| Breadth of the fore arm at the elbow | 0 | 1 | 2 |
| Thickness of ditto | 0 | 0 | 6 |
| Circumference of the wrist | 0 | 1 | 11 |
| ———— of the metacarpus | 0 | 1 | 10 |
| Length of the wrist to the nails | 0 | 1 | 6 |
| ———— of the leg from the knee to the heel | 0 | 3 | 0 |
| Greatest breadth of the leg | 0 | 1 | 11 |
| ———— thickness of ditto | 0 | 0 | 9 |
| Breadth at the small of the heel | 0 | 0 | 11 |
| Circumference of the metatarsus | 0 | 2 | 2 |
| Length from the heel to the point of the nails | 0 | 2 | 11 |
| Breadth of the fore foot | 0 | 0 | 9 |
| ———— of the hind foot | 0 | 1 | 0 |
| Length of the largest nails | 0 | 0 | 4 |
| Breadth at their base | 0 | 0 | 1½ |
| Distance from the anus to the base of the tail | 0 | 0 | 9 |
| ———— to the base of the sheath of the penis | 0 | 1 | 2 |
| Length of the sheath of the penis | 0 | 0 | 9 |
| Distance between the two anterior teats | 0 | 4 | 6 |
| ———— posterior ditto | 0 | 5 | 0 |
| ———— the first and second pair of ditto | 0 | 2 | 6 |

It will be seen by this description that the *Utia* is an animal, whose general form is that of the rats properly so called, except that the body is thicker, that its hind quarters are more bulky, and its legs shorter and much thicker. Its hind feet are similar to those of the Marmot, and we may consider it as forming an intermediate link between the latter animal and the true rats.

Under these circumstances, I do not hesitate to form it into a particular genus, to which I give the name of *Capromys*, from *Καπρος aper* and *μυρ mus*, indicating by this designation, a resemblance which the hard hairs of this animal, its sombre colour, and its gait in running, give it to the wild boar.

I grant, however, that this genus will not be sufficiently established until the arrangement of its teeth is known.

I have dedicated the species to the zealous traveller that made it known to me.

With respect to the habits of the *Utias* in a wild state, I know only that they are found in woods, that they climb trees with great facility, and that they live on vegetables.

In a domesticated state, in which those which I possess are living, I have made the following remarks.

Their intelligence appears to me developed to as great a degree as that of rats and squirrels; much more so than that of rabbits and guinea pigs. They have in particular a great share of curiosity.

They appear to be very wakeful at night, which is indeed indicated by the form of the pupils.

The sense of hearing does not appear to be so fine as that of rabbits and hares.

Their nostrils are incessantly in motion, especially when they smell any new object.

Their taste is sufficiently delicate to enable them to distinguish and reject vegetables when they are given to them, which have been touched by animal substances, to which they manifest the greatest repugnance.

They agree perfectly well together, and sleep close to each other. When they are apart, they call each other by a sharp cry, differing little from that of a rat, and their voice, when they express pleasure, is a low soft kind of grunting. They scarcely ever quarrel except for food, as when one piece of fruit only is given for them both; in that case, one seizes and runs away with it, until the other is able to take it from him.

They sometimes play for a long time together, holding themselves upright, in the manner of Kangaroos, firmly supported upon the broad soles of their feet, and the base of the tail, and striking each other with the hands, until one of them finding a wall or some other body against which to support himself, acquires additional power and gains an advantage. They never bite each other.

They manifest the greatest indifference to other animals, paying no attention even to cats.

They are fond of being caressed, and particularly of being scratched under the chin. They do not bite, but slightly press with the incisive teeth, the skin of those who caress them.

They do not ordinarily drink ; I have however occasionally seen them suck up water as Squirrels do. Their food consists solely of vegetables, such as cabbage, succory, grapes, nuts, bread, apples, &c. &c. They are not very difficult in the choice of their food, but I have observed that they have a particular fondness for strong flavoured herbs and aromatic plants, such as wormwood, rosemary, geraniums, pimpernel, celery, &c. &c. Grapes pleased them much, and to obtain them, they instantly climbed up a long pole, at the top of which the fruit was placed. They are also fond of bread steeped in aniseed, or even wine.

Their excrements are elongated black lumps, similar in consistence to the dung of rabbits, but smaller.

Their urine, white like that of the rabbit, reddens in drying the white linen which had been wetted with it, and this colour is deeper when the food has been dry.

The chemical analysis of the urine of the *Utia*, made by M. Lassaigne, presents the following results.

- 1st. Urea ;
- 2d. A reddish oil combined with potass ;
- 3d. Animal mucilage of a brown colour ;
- 4th. Benzoate of potass ;
- 5th. Sulphate of potass ;
- 6th. Muriate of potass or soda ;
- 7th. Carbonate of lime.

This secretion is very analogous to that of the rabbit and beaver, which have been analysed by M. Vauquelin. It differs however from the urine of the beaver, which contains acetate of magnesia in addition.

These animals are almost absolutely plantigrade ; their movements are slow, and the hinder parts are as it were embarrassed when they walk, as is observed in the bear.

They leap occasionally by suddenly turning round from head to tail, like the field mouse.

They gallop when at play, making a considerable noise with the soles of their feet.

When they climb, which they do with great ease, they assist themselves with the base of their tail, as a support, and the same in descending. In certain positions, on a stick for example, the tail serves as a balance to preserve the equilibrium.

They often raise themselves to a listening posture, sitting erect, with the hands hanging down, like rabbits and hares.

In eating they employ sometimes both, at other times one only of their hands. The latter happens when the substance they are holding is small enough to be held between their fingers and the tubercle at the base of the thumb.

Such are the observations which I have been able to make upon these animals, discovered three centuries ago, and the existence of which has been entirely unknown since that period.

When either of the individuals in my possession dies, I shall communicate its internal organization, and thus complete the description of this interesting species.

EXPLANATION OF PLATE I.

Fig. 1. *Capromys Furnieri*, half the natural size.

2. The muzzle, nat. size.

3. The under part of the left fore-foot, nat. size.

4. hind ditto, nat. size.

5. Portion of the tail enlarged, to shew the disposition of the scales and hairs which cover that part.

ART. XIII.—*Catalogue of Birds, and of Terrestrial and Fluvialile Mollusca, found in the vicinity of Geneva.*

Dear Sir,

The accompanying catalogues are extracted from a little work entitled, "*Essai statistique sur le Canton de Genève*;" the list of the Birds is by Prof. Necker, and that of the Terrestrial and Fluvialile Mollusca by Prof. Jurine; conceiving that such catalogues tend to advance our knowledge of the mode in which ani-

mal life is distributed over the surface of the globe, I have been induced to forward them to you, more particularly as I believe the work in which they are contained is little known to British naturalists. Believe me,

Yours, &c.

H. T. DE LA BÈCHE.

CATALOGUE OF BIRDS FOUND IN THE CANTON OF GENEVA.

r. rare—v. r. very rare—p. bird of passage—a. p. accidental bird of passage.

| | |
|---------------------------------|--------------------------|
| Falco Ossifragus (v. r.) | Corvus graculus. |
| — Haliaetus | — Pica |
| — Milvus (p.) | — glandarius |
| — Buteo | Coracias garrula (a. p.) |
| — albidus (r.) | Oriolus galbula |
| — lagopus (v. r.) | Lanius cineræus |
| — apivorus (r.) | — rufus |
| — pygargus | — Collurio. |
| — palumbarius | Loxia coccothraustes |
| — nisus (p.) | — pyrrhula |
| — {Æsalon } | — chloris |
| — {Lithofalco } (p.) | — serinus |
| — peregrinus (v. r.) | — italica (r.) |
| — subbuteo. | Fringilla cælebs |
| — rufipes (a. p.) | — montifringilla (p.) |
| — tinnunculus. | — domestica. |
| Strix Bubo (r.) | — montana |
| — Otus | — petronia. |
| — Scops (v. r.) | — cannabina. |
| — {Aluco } | — carduelis |
| — {stridula } | — Spinus. |
| — flammea | — linaria. |
| — Ulula | Emberiza citrinella |
| — passerina. | — miliaria (r.) |
| Picus viridis | — hortulana (v. r.) |
| — canus (v. r.) | — cirrus. |
| — major. | — cia (r.) |
| — medius | — schæniclus. |
| — minor | Turdus viscivorus (p.) |
| Yunx torquilla (p.) | — musicus. (p.) |
| Sitta europæa | — pilaris (p.) |
| Upupa Epops (p.) | — iliacus (p.) |
| Certhia familiaris | — Merula. |
| — muraria | — saxatilis |
| Merops apiaster (v. r.—a. p.) | Ampelis garrula. (a. p.) |
| Alcedo Ispida | Muscicapagriseola (p.) |
| Cuculus canorus (p.) | — atricapilla (p.) |
| — rufus. (variety of the above) | — luctuosa (p.) |
| Corvus Corax. | — parva (p.) |
| — Corone. (p.) | Motacilla alba |
| — Cornix. (r.) | — boarula |
| — frugilegus (p.) | — flava. |
| — Monedula (p.) | Sylvia luscinia (p.) |

Sylvia orphea (p.)
 — *atricapilla* (p.)
 — *cinerea* (p.)
 — *curueca* (p.)
 — *hippolais* (p.)
 — *aquatica* (p.)
 — *trochilus*
 — *rubecula*
 — *suecica* (p.)
 — *tythis* (r.)
 — *phoenicurus*.
 — *modularis* (p.)
 — *fitis*
 — *regulus*.
 — *trogodytes*.
Alauda arvensis
 — *arborea*. (p.)
 — *brachydactyla*.
Anthus arboreus (p.)
 — *pratensis* (p.)
 — *rufescens* (p.)
 — *aquaticus* (p.)
Cinclus aquaticus
Sturnus vulgaris (p.)
Parus major
 — *ater*
 — *cristatus*
 — *cæruleus*
 — *palustris*
 — *caudatus*
 — *biarmicus* (v. r.)
Saxicola Cœnanthe (p.)
 — *rubetra* (p.)
 — *rubicola* (p.)
Hirundo rustica (p.)
 — *urbica* (p.)
 — *riparia* (p.)
 — *apus* (p.)
 — *melba* (p.)
Caprimulgus Europæus (p.)
Columba palumbus (p.)
 — *ænas* (p.)
 — *Turtur* (p.)
Tetrao bonaria (p.—v. r.)
Perdix cinerea
 — *Coturnix*.
Phœnicopterus ruber (v. r.)
Platalea leucorodia (v. r.)
Ardea vulgaris
 — *purpurea*
 — *alba* (v. r.)
 — *garzetta* (v. r.)
 — *Nycticorax*.
 — *stellaris*
 — *minuta*
 — *comata*. (r.)
Ciconia alba
 — *nigra* (r.)
Grus communis (v. r.)

Tantalus falcinellus (v. r.)
Numenius arquatus (p.)
 — *phæopus* (p.)
Scolopax rusticola (p.)
 — *media* (p.)
 — *gallinago* (p.)
 — *gallinula* (p.)
Totanus maculatus (r.)
 — *fuscus* (r.)
 — *limosus* (r.)
 — *glottis* (r.)
 — *agocephalus* (r.)
 — *lapponicus* (v. r.)
Tringa pugnax (p.)
 — *interpres* (v. r.)
 — *ochropus* (p.)
 — *hypoleucus* (p.)
 — *cinclus* (p.)
 — *pusilla* (p.)
 — *cinerea* (p.)
 — *alpina* (r.)
 — *striata*.
 — *calidris*.
Arenaria vulgaris
Vanellus vulgaris (p.)
 — *helveticus* (r.)
 — *varius* (r.)
Phalaropus hyperboreus (v. r.)
 — *platyrhynchos* (v. r.)
Charadrius ædicnemus (r.)
 — *pluvialis* (p.)
 — *morinellus* (v. r.)
 — *hiaticula*. (p.)
 — *cantianus* (r.)
Cursor Europæus ?
Hæmatopus ostralegus (a. p.)
Himantopus vulgaris. (r.)
Recurvirostra Avocetta (a. p.)
Glareola austriaca (r.)
Rallus aquaticus (p.)
 — *crex*. (p.)
Gallinula porzana (p.)
 — *pusilla* (p.)
 — *chloropus*.
Fulica atra
Podiceps cristatus (p.)
 — *parotis* (p.)
 — *auritus* (p.)
 — *obscurus* (r.)
 — *minor*. (p.)
Colymbus arcticus (v. r.)
 — *stellatus* (p.)
 — *Immer* (v. r.)
Larus ridibundus
 — *fuscus*. (v. r.)
 — *canescens*
 — *tridactylus* (r.)
 — *parasiticus* (r.)
Sterna Hirundo (p.)

| | |
|--|---------------------------------|
| <i>Sterna nævia</i> (p.) | <i>Anas Anser</i> (p.) |
| — <i>fissipes</i> (p.) | — <i>Marila</i> (a. p.) |
| — <i>nigra</i> (r.) | — <i>Strepera</i> (r.) |
| — <i>minuta</i> (r.) | — <i>clangula</i> (p.) |
| — <i>caspia</i> (a. p.)* | — <i>Penelope</i> (p.) |
| <i>Pelecanus onocrotalus</i> (a. p.—v. r.) | — <i>anita</i> (r.) |
| — <i>Carbo</i> (v. r.) | — <i>ferina</i> (p.) |
| — <i>graculus</i> (v. r.) | — <i>querquedula</i> (p.) |
| <i>Mergus Merganser</i> (r.) | — <i>Crecca</i> (p.) |
| — <i>Serrator</i> | — <i>clypeata</i> (r.) |
| — <i>albellus</i> (r.) | — <i>leucocephala</i> (v. r.) |
| <i>Anas fusca</i> (a. p.) | — <i>Boschas.</i> |
| — <i>nigra</i> (a. p.) | — <i>fuligula</i> (p.) |
| — <i>Tadorna</i> (a. p.) | — <i>leucophthalmos</i> (v. r.) |
| — <i>Cygnus</i> (a. p.) | — <i>rufina</i> (v. r.) |

**Terrestrial and Fluvatile Molluscæ found in the vicinity of
Geneva.**

| | |
|------------------------------|---------------------------------|
| <i>Cyclostoma elegans.</i> | <i>Pupa muscorum.</i> |
| — <i>patulum.</i> | — <i>edentula.</i> |
| — <i>maculatum.</i> | — <i>tridens.</i> |
| <i>Paludina viviparum.</i> | — <i>quadridens</i> |
| — <i>impurum.</i> | — <i>cinerea.</i> |
| — <i>viride</i> | — <i>variabilis.</i> |
| — <i>obtusum</i> | — <i>Polyodon.</i> |
| <i>Valvata planorbis.</i> | — <i>Frumentum</i> |
| <i>Planorbis marginatus.</i> | — <i>Secale.</i> |
| — <i>carinatus</i> | — <i>Avena</i> |
| — <i>complanatus.</i> | — <i>Granum.</i> |
| — <i>hispidus.</i> | <i>Clausilia plicatula.</i> |
| — <i>vortex.</i> | — <i>rugosa.</i> |
| — <i>spirorbis.</i> | <i>Bulimus radiatus</i> (v. r.) |
| — <i>contortus</i> | — <i>montanus.</i> |
| — <i>nitidus.</i> | — <i>acutus</i> |
| <i>Ancylus lacustris</i> | — <i>ventricosus.</i> |
| — <i>fluvialis</i> | — <i>obscurus.</i> |
| <i>Physa fontinalis.</i> | — <i>lubricus</i> |
| — <i>hypnorum.</i> | — <i>Acicula</i> |
| <i>Auricula myosotis.</i> | <i>Helix pyramidata.</i> |
| — <i>lineata.</i> | — <i>elegans</i> |
| <i>Succinia amphibia</i> | — <i>fruticum.</i> |
| — <i>oblonga.</i> | — <i>variabilis.</i> |
| <i>Limneus stagnalis.</i> | — <i>rupestris.</i> |
| — <i>auricularius</i> | — <i>strigella.</i> |
| — <i>glutinosus</i> | — <i>pomatia.</i> |
| — <i>Pereger</i> | — <i>rhodostoma.</i> |
| — <i>palustris.</i> | — <i>arbustorum</i> |
| — <i>minutus.</i> | — <i>aspersa.</i> |
| <i>Pupa Dolium</i> | — <i>vermiculata</i> |
| — <i>Doliolum</i> | — <i>sylvatica.</i> |
| — <i>umbilicata.</i> | — <i>nemoralis</i> |
| — <i>marginata</i> | — <i>hortorum.</i> |
| — <i>Vertigo</i> | — <i>splendida.</i> |
| — <i>antivertigo.</i> | — <i>personata.</i> |
| — <i>pygmæa</i> | — <i>carthusianella.</i> |

* Once killed at Versoix.

Helix incarnata.
 — pubescens.
 — cespitum.
 — ericetorum
 — villosa.
 — hispida.
 — lucida.
 — conspurcata.
 — striata.
 — plebeium.
 — lapicida.
 — obvoluta.
 — pulchella.
 — nitida.

Helix nitidula.
 — rotundata.
 — crystallina.
Vitrina pellucida.
Testacella haliotoidea.
 — ovum.
Limax scutellaris.
Cyclas cornea.
 — lacustris
 — fontinalis.
Unio pictorum
 — littoralis.
Anodon anatinus
 — cygneus.

ART. XIV.—*Abstract of a Memoir on the Physiology of Helix Pomatia.* By B. GASPARD, D. M.; with Notes by T. BELL, F. L. S.

§. 1. In our temperate climate, about the beginning of October, as the first chills of autumn are felt, these *Helices* become indolent, lose their appetite, and associate in considerable numbers on hillocks, the banks of ditches, or in thickets, hedges, &c. In a day or two they cease to eat, expel the last contents of the intestines, and then conceal themselves under moss, grass, dead leaves, &c. Here each forms for itself, with the anterior part of its muscular foot, a cavity sufficiently large to contain at least its shell; this it enlarges and excavates by turning itself round on every side, then raising itself against the sides of the cavity, and at last against the roof formed of moss or leaves, or a small quantity of earth brought there by the motions of the animal. When it has got so far as to bring the opening of the shell to nearly a horizontal position, it ceases. It soon contracts the foot within the shell; expands, so as completely to cover it, the collar of the mantle, which is at this period of a very white colour, and opens for a time the pulmonary cavity to inspire a quantity of air. On closing this, it forms with the mucus, a fine transparent membrane, interposed between the mantle and such extraneous substances lying above as might be injurious. Soon afterwards the mantle se-

* From Majendie's *Journal de Physiologie*, tom. ii, p. 295.

cretes a large quantity of very white fluid over its whole surface, which instantly sets uniformly, like plaster of Paris, thus forming a solid covering, about half a line in thickness. When this operculum is hardened, the animal separates its mantle from it, by another mucus web stronger than the former; and after a few hours, expelling a portion of the air it had previously taken into the lungs, it retires by this means a little farther into the shell, forms another lamina of mucus, retires again expiring another quantity of air, and thus sometimes forms a fourth, fifth, and even sixth partition, with intermediate cells filled with air.*

§. 2. The labour of each individual continues for about two or three days. But the whole of the month of October is occupied by the general closing of the shells of the species, and after the very commencement of November, we find none of them, except perhaps a few diseased individuals, which, not being capable of hibernating, perish with the first frosts.

If from any obstacle the orifice of the shell is not brought to a horizontal position, but is found more or less inclined, it often happens that the calcareous fluid before it is completely fixed, sub-

* The account here given by M. Gaspard does not completely explain the manner in which the excavation is formed. It is not by the pressure of the foot and the turning round of the shell that this is principally effected. A large quantity of very viscid mucus is secreted on the under surface of the foot, to which a layer of earth or dead leaves adheres; this is turned on one side, and a fresh secretion being thrown out, the layer of earth mixed with mucus is left. The animal then takes another layer of earth on the bottom of the foot, turns it also to the part where he intends to form the wall of his habitation, and leaves it in the same manner, repeating the process until the cavity is sufficiently large, and thus making the sides smooth, even, and compact. In forming the dome or arch of the form, a similar method is used, the foot collecting on its under surface a quantity of earth, and the animal turning it upwards, leaves it by throwing out fresh mucus, and this is repeated until a perfect roof is formed. As I have very often watched this curious process, I am certain of the facts. On removing very carefully a portion of the roof soon after its completion, I was enabled to see the formation of the operculum. In about an hour or even less after the hibernaculum is covered in, the whole surface of the collar of the mantle instantaneously pours out the calcareous secretion in considerable quantity. This is at first as fluid as thick cream, but very soon acquires exactly the consistence of bird-lime, being excessively adhesive and tenacious; and in about an hour after it is poured out it is perfectly solid. T. B.

sides toward the lowest part, and the result is a deformed and insufficient operculum.

Finally, I believe I have established that the membranous partitions are more numerous at the end than at the beginning of winter, and in the snails inhabiting the mountains, than in those found on low ground.

§ 3. The snail thus enclosed passes six months in a state of total torpidity, and it is not until the spring that it bursts its prison and returns to its ordinary habits. But if we take off the operculum shortly after its formation, it emerges from its shell, walks about again, and assumes different habits according to circumstances. 1st. If the temperature be about 12 or 15 degrees Reaum. (59-67° Fahr.) and the snail finds food, it begins to feed again, recovers the whiteness of its mantle, which had become grey and lean, and in about eight days makes another form, in which it buries itself, and forms a fresh operculum, as solid as the former. 2dly. If the temperature should be colder, as for instance, 8 or 10° R. (50-55° F.) it eats but very little, and soon forms its hole in the earth, but produces only a slight, flexible, greyish, operculum, with but little earthy matter in its composition. 3dly. If the temperature be but little above the freezing point, as at 3 to 6° R. (39-45° F.) it refuses food entirely, scarcely moves, has no strength to make its form, and produces only a membranous enclosure. 4thly. If the temperature be below freezing point, the snail makes no attempt at hibernation, and soon perishes with cold.

§ 4. It appears from the analyses to which I have submitted the operculum, that it consists wholly of carbonate of lime. Thus it dissolves rapidly with a brisk effervescence in the mineral acids and in vinegar; and all these solutions, treated with soda or potass, throw down an abundant white precipitate. On the other hand, calcination reduced it to the state of caustic lime.

The secretory organ of this calcareous matter is the collar or finger of the mantle, a most important organ, since it is also the part from which the shell itself is formed.* It is found to contain

* Although it would appear from some circumstances, such as the filling up of the apex of the shell, that other parts are occasionally capable of producing a calcareous secretion, yet there is no doubt that the edge or collar of the man-

in its glands or vessels the carbonate of lime in a free state, so that when the surface of the collar is touched by any foreign body, at each point of contact, a quantity of it is thrown out mixed with a tenaceous mucilage. To be still further convinced of the fact, I cut off the collar of the mantle, and having thrown it into a dilute acid, a quantity of gas was given off, and the liquid gave the usual white precipitate with the addition of soda. No other structure similarly treated afforded the same results.

It is not therefore surprising that the collar of this snail should be so plump and white in autumn previous to the hibernation, and so lean and grey when it makes its appearance in April, or when the operculum is taken off in the intermediate time. The animal derives this calcareous fluid not merely from its ordinary vegetable food, but chiefly from the earth which it eats in great abundance, by means of which the necessary quantity of lime is kept up, and its loss repaired with facility. On this account we see these snails when deprived of nourishment unable to form any thing more than mere membranous substitutes for the former calcareous opercula which had been removed.*

tle is the organ which ordinarily performs this function. I have at different times cracked the shell, removed small portions, and drilled holes through it, at different parts, and I have found that if the injury were within the reach of the edge of the mantle, it was always drawn up to repair it. I will particularize one only of these experiments to shew the manner in which this is done. I drilled a hole in the shell of *Helix pomatia* in the last whorl but one, thinking that it could not draw the edge of the mantle high enough to repair it in the usual way; however it effected this immediately by protruding the foot to make room for the mantle being drawn high up into the shell, and as soon as the edge came in contact with the injured part, it was passed repeatedly over the hole, leaving a layer of calcareous matter each time until it became opaque; and in a day or two, on examining it, I found the newly formed part apparently as strong as the rest of the shell. Another curious circumstance connected with this subject, is, that in the species of snails with coloured bands, *H. nemoralis* for instance, there are the same number of bands on the mantle as in the shell; which are brown and transparent, and these probably contain comparatively little carbonate of lime. It is therefore not unlikely that the glands necessary for secreting this substance, do not exist, at least to an equal degree, in those parts of the mantle marked by the bands. This, however, is but a conjecture, and only important as connected with a subject which deserves a much more accurate investigation than has ever yet been bestowed upon it.

T. B.

* These circumstances may account for *H. pomatia* thriving more, and being

M. Gaspard's experiments on this and other species prove that although the approach of cold may be considered as the principal cause of their hibernation, yet it is not the only one, as he failed to produce this effect by submitting them to artificial cold, nearly to the freezing point, and he found that they hibernate at the proper period, at very different degrees of temperature, varying, according to the table which he has given, from 2° to 20° R. (37° to 77° Fahr.)

Proceeding to an examination of the state of the vital functions during the period of hibernation, the following are the results of the author's numerous and minute experiments. It is of course evident without requiring proof, that generation, sensation, the cerebral and nervous functions, and locomotion, are totally suspended. The only indication of irritability perceptible during this period, is a slight contraction of the collar of the mantle when touched, on removing the operculum.

It is therefore to the functions of digestion, circulation, respiration, animal heat, nutrition, secretions, and absorption, that these experiments refer.

§. 8. As these animals eat nothing during the period of hibernation, digestion is of course suspended. Dissection of many individuals in this state, discovered the stomach entirely empty, and the intestines filled with a brown thick liquid, but without the least trace of excrement.

§ 9. If in the month of November, before the severe cold sets in, a portion of the shell of an operculated snail be removed, the heart is seen contracting regularly, but feebly and with a very slow pulsation. But if it be thus exposed during the winter, when the temperature is down to the freezing point, it is found to have totally ceased to beat. On exposure to a slight degree of warmth the motions of the heart are renewed, and again suspended on its removal. This may be often repeated with the same result in greater quantities in chalky districts. That lime is not necessary to be eaten, in order to the perfect formation of the operculum, is however proved by many in my possession having formed that substance, though during the whole summer they had no access to any preparation of lime. Still I have no doubt that it may greatly assist in rendering it solid and efficient. B.

sults. It appears therefore that during the complete hibernation of the snail, the circulation is entirely suspended.

§ 10. Respiration is also found by the experiments of the author, to cease during this period. If the snails remained submersed during the whole time, they did not perish : and it is proved that they do not respire the air which fills the space between the operculum and the animal, by its being found to possess the usual proportion of oxygen, on being collected and submitted to tests at the latter part of the period of hibernation.

§ 11, 12. The animal heat, which even in the summer, when respiration and circulation are most lively, does not exceed one degree above the surrounding atmosphere, is not perceptible during the months of torpidity. The animal becomes frozen when exposed to cold at exactly the same degree as any other gelatinous body, if the shell is not closed by its operculum ; whilst on the other hand those which are perfectly operculated, and slightly covered with earth, endure without injury all the rigours of winter. This power of enduring cold however has its limits, and it appears that on being submitted to a temperature of 16° Fahr. they are frozen, and on becoming thawed, although sometimes they shew signs of life, and even walk, they soon re-enter their shells and shortly after die. At a lower degree, approaching Zero of Fahr., they perish at once.

§ 13. Their power of sustaining a high degree of heat is no less extraordinary. If exposed to 100° F. they indicated a high great of irritability, alternately emerging from their shells, and re-entering them, and on the temperature being raised to 120°, they appeared dead but became resuscitated on its gradual diminution. Even after sustaining a still higher degree of heat they became slightly re-animated, but subsequently perished ; and on being exposed to 127° they were found to be irrecoverably destroyed. Similar experiments made by warm water afforded the same results.

§ 14. Respecting the remaining functions of these animals, secretion, nutrition and absorption, the following is the result of the author's observations. On examining the fringe of the mantle, on the resuscitation of the animal in the spring, it is invariably found in the same state of leanness, and of the same greyish colour as

immediately after the formation of the operculum, proving that the secretion has not gone on during hibernation. One of the animals had suffered the removal of the large tentacula in the month of June, which had been partially reproduced at the period of hibernation, and in the next spring the reproduction was found not to have advanced in the slightest degree during that period. Respecting the functions of nutrition and absorption the author arrives at a similar conclusion.

§ 15. It is therefore proved that during the winter, that is to say, for five, six, seven, or even eight, or nine months, according to the climate and season, these animals exist without motion, animal heat, nutrition, respiration, circulation, &c. in a word, deprived of all their animal, organic, and generative functions. This obscure existence cannot in fact be properly called life, but rather a simple aptitude for life, on the return of the genial temperature of spring.

§ 16. In our climate it is about the beginning of April, soon after the song of the cuckoo begins, and the swallows appear, that the snails leave their torpid state, varying a little however according to the season. The mode by which their escape from confinement is effected is simple and easily comprehended. The air which is contained in the different cells, and which had been expired on the animal withdrawing itself farther and farther into the shell after the formation of the operculum, is again inspired, and each separate membranous partition broken by the pressure of the hinder part of the foot projected through the mantle. When it arrives at the calcareous operculum, the animal, making a last effort, bursts and detaches its most obtuse angle. Then insinuating by little and little the edge of the foot between the shell and the operculum, it forces the latter off or breaks it away. The animal then comes forth, walks, and immediately begins feeding with an appetite excited doubtless by an abstinence of six or seven months.*

* It cannot be supposed that the long abstinence of the animal has any effect in exciting its appetite, when it is recollected that during the whole of its hibernation, it is in a state of temporary death, and neither secretion, the production of animal heat, nor any other wasting function going on. B.

§ 17. It appears from the experiments of M. Gaspard, that the return of warmth is not alone sufficient to restore the animation of these animals. If they were exposed during the winter to a dry heat of from 60° to 100° for several days, or even weeks, not one made its appearance. Whilst on the contrary, those which were placed in a deep recess, the regular temperature of which was 50° , came forth in April or at the beginning of May without any increase of temperature. But such as were placed in water and exposed to 77° in two or three days broke their operculum and came forth; this experiment was equally successful when made in January or April, and when the temperature was at 60° or 75° . And it is found that exposure to damp is so necessary to their re-animation, that if two be placed near each other in rainy weather, and one of them be covered with a glass, it remains without an effort to emerge from its confinement long after the other has broken its operculum and resumed its functions. It appears therefore from these facts that the return of the spring, with heat and moisture, all combine to effect their re-animation.

§ 18. The author proceeds to state the circumstances by which the resuscitation may be retarded; and he found that this could be effected with the greatest certainty by exposing them constantly to a dry heat, by which he kept some of them from bursting their operculum, even till October. And these invariably became re-animated on being placed in water, though they were very feeble and ultimately perished. Although the author preserved them in this state for even 12 months, he does not consider the state of actual torpidity to continue beyond the usual period of hibernation, but that the heart and other organs re-commence to a certain degree their functions, which accounts for their being always found so enfeebled afterwards.

§ 19. These circumstances lead to the consideration of the fact that the snails retire within their shells during the heat of summer; closing the aperture with a membrane. In this state they remain night and day whilst the dry heat continues, but no sooner does a shower fall than they break the covering and walk; and this may be at any time effected by watering the ground near them.

[To be continued.]

ART. XV.—*Memoir on the Chemical Composition of the Corneous parts of Insects.* By M. AUGUSTUS ODIER.*
With some additional remarks and experiments, by J. G. CHILDREN, Esq. F.R.S. L.S. &c.

Experiments, often repeated, have long since taught us the chemical composition of the bones of vertebrated animals of the first order. The skeletons of animals of inferior rank in the zoological scale, have also been subjected to chemical analysis, for the purpose of comparison with those of the former, whence we have obtained a knowledge of the component parts of the bones of fishes, the shells of mollusca and crustacea, and the hard portions of the zoophyta.

The solid parts of the bodies of insects, however, have never been made the subject of chemical research; naturalists have been satisfied with likening them to those animal substances which they most nearly resemble either in their functions, or natural appearance; hence some, comparing them to the bones of vertebrated animals, have named them osseous parts, and have even ventured to call the whole assemblage the skeleton of the insects; others, on the contrary, likening them to the integuments of vertebrated animals, have considered them as hardened skin, or a matter analogous to horn.

In undertaking to investigate the chemical composition of these organs, my object is not to support either of these two opinions; I shall examine the substances with the sole view of ascertaining their composition, without seeking to associate them with any particular organ of the superior animals:

The analysis of some *Crustacea*, by M. M. Merait, Guillot, and Chevreul, are the only works that have been published, as far as I know, on animals approaching the class of insects; and amongst these much discrepancy exists as to the composition of their integuments.*

* Translated from the "Memoires de la Societ  d'hist. nat. de Paris," vol. I.

† Has M. Odier never heard of Mr. Hatchett's elaborate "Experiments and Observations on Shell and Bone," or his "Chemical Experiments on Zoophyta?" See Phil. Trans. 1799 and 1800. C.

M. Robiquet's labours on Cantharides having been directed to the entire insect, and undertaken with particular views, very different from mine, have furnished me with only a few insulated facts. I must, therefore, claim the indulgence of scientific men, in proportion to the novelty of the subject I am entering on, and in the study of which I have only my own judgment to trust to.

The horny parts of insects consist of an assemblage of pieces which form the covering of their bodies, and of some of their internal parts. As they all appear to me to be of the same nature, I have chosen the elytra for the basis of my analysis, as being the most insulated pieces, and consequently the most free from foreign substances, and have afterwards compared the other parts with them.

I proceed to the examination of those organs in the order in which I submitted them to experiment.

The Cockchafer (*Hameton*—*Scarabæus melolontha*, Lin.) being the commonest insect at the season when I began my operations, I made the elytra of that animal the subject of my researches.

I first submitted them to the action of water. One gramme (15,444 Grs.) of the Cockchafer's elytra, well cleaned, was infused in cold water, for twelve hours. When decanted, the water was slightly tinged of a yellow colour and had become rather less fluid.

To ascertain the substances dissolved in this liquid, I evaporated the solution to dryness with a gentle heat. As the liquid became warm some greenish brown filaments formed in it, indicating the presence of a small quantity of albumen. The same elytra being treated repeatedly with water, the infusions were mixed together and afforded by evaporation 0.04 of a gramme (0,6176 Gr.) of a substance composed of extractive matter, and a little coagulated albumen. The residuum acted on by water restored the blue colour of litmus paper which had been reddened by an acid. To discover the nature of the alkali, the extract was calcined in a platina capsule; the small quantity of ashes, thus obtained, dissolved with effervescence in an acid, and the solution gave a yellow precipitate with muriate of platina. Hence the alkali was carbonate of potassa.

Another gramme of the same elytra was treated several times with hot alcohol: the decanted liquors being evaporated, the extract obtained afforded some small drops of a brown oil. Water took up from it a brown extractive matter, similar to that found in the aqueous solution, together with a substance sensibly alkaline to the taste. This liquor, in consequence of the presence of the alkali, dissolved a little fatty matter, which separated on the addition of muriatic acid, the acid at the same time occasioning a slight effervescence. The liquid, evaporated and calcined, left a salt which gave a yellow precipitate with muriate of platina, consequently it was muriate of potassa. Hence we find in this experiment the carbonate of potassa observed in the aqueous infusion.

When the extract of the alcoholic liquor which has acted on the elytra is treated with water, a brown fatty matter is left which spots paper like grease, and increases its combustibility. This substance has a decided smell of bile.

Having submitted the elytra to the action of water and alcohol, I wished to try that of potassa on them, which acts so powerfully on all sorts of animal substances. For this purpose I took two grammes (30·88 grs.) of elytra, and treated them with a hot solution of caustic potassa. The solution assumed a deep brown colour. I renewed the solution several times, until it ceased to have any further action on the elytra. During the action of the alkali, a slight disengagement of ammonia was perceptible, as happens in all solutions of animal substances in potassa.

The alkaline solutions had a deep brown colour, as before observed. Saturated with muriatic acid, a brown flocculent matter precipitated, and collected at the bottom of the vessel. The alcohol became coloured yellow brown, and left, after evaporation, a brown fatty matter, having the odour of bile. This matter was the same as that extracted from the elytra by alcohol; it might perhaps be slightly altered, as it had been dissolved, and probably saponified by the potassa. The portion of the precipitate, insoluble in alcohol, was brown and solid. It was not particularly examined. The elytra after the action of the potassa, became colourless, and transparent like thin horn, without experiencing any change in their original form. They lost nearly three

fourths of their weight by the operation, the two grammes furnishing only 0.585 gramme (9.03 grs.) of transparent matter insoluble in potassa.

Having ascertained the presence of the different substances mentioned above in these organs, I was curious to enquire if they do not also contain some saline matter in their composition. I therefore incinerated two grammes of elytra, previously boiled in water, and consequently freed from all soluble salts.

Whilst burning, the elytra exhibit a character which distinguishes them from the animal substances to which they are commonly compared. They neither fuse nor swell up like horn, hair, or nails; on the contrary, they remain solid as they burn and leave a coal, which retains the form of the elytrum.* Two grammes afforded by incineration 0.01 gr. (0.1544 gr.) or $\frac{1}{200}$ th of their weight of a white ash mixed with some yellow specks. This ash thrown into water and treated with muriatic acid, gave no appearance of effervescence; it therefore contains no carbonate. The whole dissolved in the acid, which was distinctly coloured yellow.

Ammonia gave a white precipitate with this solution, which was also rendered turbid by oxalate of ammonia, indicating the presence of lime, and prussiate of potassa turned it sensibly blue. The ash, therefore, consisted of a mixture of phosphate of lime, and a little phosphate of iron.

Having thus ascertained in the elytra the presence of 1. albumen; 2, extractive matter soluble in water; 3, a brown animal substance soluble in potassa, and insoluble in alcohol; 4, a coloured oil, soluble in alcohol; 5, a peculiar matter, constituting $\frac{1}{4}$ th of the weight of the elytra; and 6, three salts, viz. carbonate of potassa, phosphate of lime, and phosphate of iron; I proceed to the particular examination of these different substances, especially those of which the elytra seem to be more essentially composed, and I shall then look for them in the various parts of the carapace of the insects.†

* The peculiar smell of animal matter when burnt, is not perceptible on burning the elytra. C.

† *Carapace.* The vaulted and generally osseous covering which protects the bodies of reptiles of the class *chelonia*, and within which they draw their head,

Albumen is distributed through almost all the animal organs, wherefore it is not surprising that it should be found in the horny parts of insects; it exists in them, perhaps, only as the principle of the nourishing juice impregnating those organs.

I have not particularly examined the extractive matter soluble in water, nor the other brown substance soluble in potassa and insoluble in alcohol, which I have mentioned above. M. Lassaigne, who has made some experiments on elytra, informs me that he has found the latter substance to be analogous to the animal matter met with in the cochineal. This substance, which exists in considerable quantity, seems to form the base of the colour of the horny pieces, for the brilliant colours which serve as distinctive characters, are almost always merely superficial on the elytra. These two bodies require to be more particularly studied, in order thoroughly to understand their nature.

Of the substance having the appearance of horn.

I have said that this substance is obtained by treating the elytra with a hot solution of potassa, and that it is consequently insoluble in that re-agent, which merely deprives it of the other animal matter with which it is associated.

This character at once distinguishes this body from many others, as horn, hair, and epidermis, which, according to M. Vauquelin, are nearly of the same nature and are all soluble in potassa. Like them *Chitine*,* the name I have given this substance from the Greek *χίτων* (a covering), is soluble in sulphuric acid with the assistance of heat. But nitric acid affords a distinguishing character of it: it is known that horn, hair, and epidermis become yellow in this acid, in consequence of the formation of a certain quantity of the bitter matter of Welther; Chitine does not become yellow by the action of nitric acid, but is dissolved when digested in it with heat.

limbs, and tail. The shell of the tortoise is called its *carapace*. (See Dict. des Sciences Naturelles. Art. *carapace*.) C.

* Every man has a right to name his own child, but we think M. Odier might have made a happier election. *Elytrine* would have been more significant and at least as euphonious. Ed.

The manner in which this matter burns without fusing, but leaving a coal which retains the original form of the organ, also serves to distinguish it. It cannot be confounded with the base of gelatine which is soluble in boiling water, nor with skin which is of the same nature ; and it is distinguished from coagulated albumen by the solubility of the latter in potassa.

It was an interesting object to ascertain whether this substance, whose characters as animal matter, are so peculiar, be really of that nature, that is to say, whether it contain nitrogen. For this purpose I burnt Chitine in a glass tube, placing litmus paper that had been reddened by an acid, at the mouth of the tube. If carbonate of ammonia be one of the products of the decomposition of the elytra, it would restore the blue colour of the litmus paper. But no such effect was produced, although it is well known, that the smallest portion of nitrogen would form carbonate of ammonia. Fearing lest I might have been deceived in this experiment by some unknown cause, I repeated it several times, and always with the same result.

This character, joined to that derived from the action of nitric acid, which does not turn chitine yellow, can leave no doubt of its vegetable nature, that is, that it contains no nitrogen. Assured of this, I naturally was led to seek amongst vegetable substances, the one most allied to Chitine. Lignin (woody fibre) is the only proximate vegetable principle which can be compared with it. It is in fact, the only body, I think, which burns without swelling up, and whose coal retains the form of the original substance.

It is very remarkable that we should thus find in the frame work of insects, the same substance that forms that of vegetables, or which at least approaches it in many of its characters. This fact will serve to confirm the opinion that nitrogen is not an essential character of animal substances.

We have now, therefore, certainly attained the knowledge of a peculiar, very singular matter, which forms the base of the elytra of insects, and is distinguished by the following characters.

It is insoluble in potassa ;

Soluble in sulphuric acid, with the assistance of heat ;

Does not become yellow by nitric acid ;

Burns without swelling, and
Contains no nitrogen.

But it was necessary to the end proposed in this analysis, to ascertain whether this horn-like substance be likewise found in the other hard parts of the bodies of insects. I easily satisfied myself by treating the entire animal with caustic potassa; by this operation the *Scarabæus nasicornis* afforded me the carapace very well freed from other matter, and transparent. All the hard parts remained in the same state as before, except as regards their transparency; the hairs, even, were still discernible, which consequently differ in their nature from the hair of vertebrated animals. This method I conceive might be advantageously employed for the purpose of examining this covering in an anatomical point of view, and for studying the parts of which it is composed.

The examination of the *Scarabæi* taught me that the membranes of the wings are not formed of Chitine, and that the sinews, (*nervures*) which are more solid, are of the same nature as the elytra, that is, that they contain Chitine, animal matter, oil and salts. The parenchymatous matter, which M. M. Thouvenel and Beau-poil, and M. Robiquet found in their analyses of cantharides, is nothing else but Chitine. From these facts, I think we may conclude, that Chitine is the base of the horny pieces of all insects, of whatever order, and apparently (for I have not made the experiment) we may extend this opinion to the arachnides. But is the presence of Chitine limited to this class, or shall we also find it in the crustacea? The fact deserves the attention of naturalists and would be well worthy of examination.

The chemists who have analysed crustacea, and M. Chevreul the last, have announced the presence of an animal substance in the carapace of those animals without distinctly stating its nature. M. Geoffroy pretends that he has found in the upper layers of this organ the cutis and epidermis of the vertebrated animals, but we shall see that this naturalist was led into error by the external appearance of those parts.

In order to examine the animal matter of the shell of the crustacea, I macerated the carapace of the common crab, for some days, in water acidulated with muriatic acid. At the expiration

of that time I took it out, perfectly freed from all earthy substances. In this state, the carapace is formed of laminæ of a soft flexible substance, with a light brown tint, laid one on the other. Having well washed this substance, I dried it in order to compare it with the chitine of insects. I first submitted it to the action of potassa in which I boiled it for a considerable time. The carapace became white, and transparent. but did not dissolve. This was already a strong reason for presuming that this matter was the same as that from the insects; but the action of nitric acid, and its decomposition by heat, which presented the same characters that I had observed in chitine, left me no doubt as to the absolute identity of the two substances. I should have been glad to have examined likewise the animal matter of the Mollusca, Zoophyta, &c. to ascertain if it be of the same nature as that of insects and crustacea; but not being able to extend my researches at present, I reserve those experiments for a future season.

Of the coloured oil contained in the elytra.

We have seen that the elytra of the Cockchaffer treated with alcohol, left, on evaporating the liquid, a brown oil. The *Crioceris merdigera*, treated in the same manner, affords a red oil, which, as M. Lassaigue informed me, is still more beautiful if the elytra be treated with ether. This oil changes readily by exposure to the air, and loses its red colour. Observing the relation that exists between the colour of these oils, and that of the insects from which they are derived, I was led to conclude that it is to them they owe their colours. Many other facts of the same nature have confirmed this opinion. Reading M. Robiquet's memoir on Cantharides, in the 76th vol. of the *Annales de Chimie*, we find that by treating Cantharides, (previously digested in water till it had no farther action) with alcohol, he obtained a fine green oil, similar to the colour of those insects.

We may conclude, I think, from these facts, that the colour of the horny pieces of insects, is derived from an oil, coloured according to the species. On examining those pieces, we observe that the colour is merely superficial, their interior being coloured by the brown animal matter.

These observations prove that the colour of the bodies of insects is owing to substances of the same nature as those which tinge the hair and fur of vertebrated animals. These oils are deposited on the surface of the horny parts only during the last period of the life of the chrysalis, for up to that moment the insect is covered with a colourless membrane.

Of the salts contained in the elytra of insects.

The elytra of the Cockchaffer contain, according to my experiments, three salts, carbonate of potassa, phosphate of lime, and phosphate of iron. Do all the horny parts of insects contain the same salts? To answer the question, I burnt several scarabæi *nasicornes*, previously cleansed, and obtained for residuum a small mass of white earthy matter, which nearly retained the form of the body. I remarked that all the hairs had a fawn colour, owing to the presence of phosphate of iron. I digested the ashes in water, and obtained a strongly coloured alkaline lie; nitrate of silver gave a white precipitate with the solution, soluble in nitric acid; muriate of baryta, also gave a precipitate, soluble in acid: consequently an alkaline carbonate was dissolved in the water. Muriate of platina gave a slight yellow precipitate with the solution—proving the alkali to be carbonate of potassa.

The portion of ashes, insoluble in water gave, like those of the elytra, a mixture of the phosphate of lime, and phosphate of iron. These observations attest the perfect similitude that exists between the salts contained in the elytra, and those contained in the other horny parts.

Having remarked, as I have said above, that the hairs of the *Scarabæus nasicornis* remained yellow after calcination, I wished to ascertain if that be a general character of the hairs of insects, and for this purpose I incinerated a considerable quantity of them, obtained from the bodies of several large peacock moths, (*grands paons—Bombyx pavonia?*) But the residuum was a white ash mixed with only some yellow specks, that is, a mixture of much phosphate of lime, with a little phosphate of iron. The first observed fact, therefore, was peculiar only to certain insects. By

comparing these results with those obtained by M. Chevreul in his experiments on the crustacea, we see the difference between the composition of the salts of the carapace of those animals, and that of the salts of the same organs in insects.

The presence of sub-carbonate is a very remarkable character in the latter, and is not found in the former. Phosphate of lime, which exists in small quantity only in the crustacea, forms the greater part of the salts contained in the coverings of insects. The absence of carbonate of lime in these, whilst it forms the base of the carapace of the former, is another great point of difference : phosphate of iron is here found accompanying the phosphate of lime, as it is in almost all the parts of animals in which the latter is deposited. It is very probable that a little phosphate of magnesia may form part of the salts of the hard parts of insects, but the small quantity of matter on which I operated did not allow me to seek for it ; I grounded my supposition, however, on the observation of M. Robiquet, who found phosphate of magnesia in cantharides, which he supposed to have been derived from the skeletons of those animals.

The difference that exists between insects and crustacea, as to the nature of the salts of their hard parts, proves very palpably the error which some naturalists have fallen into, who have attempted to establish analogies of organization on the chemical nature of those organs. According to their views, we should expect to find nearly the same materials in insects, as in the crustacea to which they are so nearly allied, and yet we observe the most decided difference. What becomes of the law which a distinguished naturalist thinks he has observed, according to whom the superior animals are characterized by their bones being formed of most phosphate of lime, and a smaller proportion of carbonate, and the inferior, by having a large proportion of carbonate and a small quantity only of calcareous phosphate in their composition ? On this view insects must quit the place assigned them by Nature, and be associated with animals of the first order, to which, however, no naturalist has pretended to ally them.

If the results I have obtained do not coincide with the ideas of some naturalists, they will not, I believe, by any means astonish

truly philosophical observers, who will never found zoological affinities on characters so inconstant as the nature of the salts which enter into the composition of the animal organs. Do we not know that these bodies are subjected to the influence of external causes of every kind ; that their composition varies with the habitation, food and age of the respective individuals, and perhaps from a number of other circumstances ? Were zoological affinities to be founded on the chemical nature of the animal organs, instead of seeking them in inorganic materials which vary from many causes, and belong exclusively to no particular organs, but are found, either habitually, or accidentally in almost all, would it not be more rational to found them on the nature of the animal substance which, in truth, constitutes the organ, because it is the product of vital action ? But, in my opinion, the chemical composition is incapable of confirming the established laws of zoology ; its proper office seems to be to furnish us with facts calculated to enlighten physiology concerning the formation and functions of the organs. It is with this sole end that I undertook my present labours, which are to be regarded merely as the point of departure for subsequent researches, and as a feeble essay, in comparison with what yet remains to be done on this subject.

Remarks on the preceding Paper.

The results of the experiments detailed in the foregoing paper seem to illustrate the beautiful gradations that prevail through the whole range of animated nature, and to establish as it were a connecting link between the vegetable and the animal kingdoms. One of the most striking differences, in the chemical composition of animal and vegetable substances, is the general prevalence of nitrogen in the former, as one of their constituent elements, and the want of it in the latter. It has, however, been long known that the rule is not in either case without exception ; thus nitrogen con-

stitutes one of the elements of the hydrocyanic (Prussic) acid, and according to Dr. Thomson, probably enters also into the composition of Indigo ; and Mr. Brande has very lately proved its existence in the vegetable salifiable bases, Cinchonia, Quinia, Morphia and Strychnia.* Some animal substances, on the contrary, are not found to contain any nitrogen, as picromel, and the animal oils, including fat. The discovery of M. Odier, if it be one, is not therefore absolutely new in a chemical sense, though none of the substances enumerated above have any analogous functions in the animal or vegetable economy, nor any external resemblance to his Chitine, which he, not unaptly, considers to bear that relation to insects, &c. that the woody fibre bears to plants, and which, according to him, it most nearly resembles in its most obvious properties.

M. Odier is led to his conclusion that Chitine contains no nitrogen, from the phenomena, amongst others, which it presents when burnt in contact with the air, and especially from its not giving off any carbonate of ammonia when distilled in close vessels. I shall not dispute the accuracy of either of the facts, but it seemed to me, on reading his Memoir, that the absence of nitrogen requires to be proved in a less equivocal manner than by the mere negative result, that the volatile products of its distillation have no effect on the test papers exposed to their influence, before we can safely adopt his conclusion that the Chitine is really destitute of that element. Suppose an acid, the acetous for instance, to be simultaneously formed in the distillation ; ammonia might be evolved and yet escape detection by the test applied. Such a case is at least possible, and the experiments I am about to relate, render it, I think, not very improbable that it may have occurred in the present instance.

The season of the year (winter) in which I made my experiments, precluding the possibility of obtaining a sufficient quantity of the same insects as those Odier operated on, I selected, because most easily procured, the common Cantharides of the shops—*Lytta vesicatoria*, Linn.—*Cantharis vesicatoria* of Olivier and Latreille.

* Journal of Science, vol. 16, p. 279.

This insect, according to the two last authors, feeds on leaves; it is, therefore, as to its habits in that respect, similar to the *Scarabæus melolontha*, and consequently not an improper subject to supply its place for the purposes of the experiments in question. Before I proceed to their detail, I shall briefly mention, that I found the same saline and other substances, in the ashes of the insects, as are mentioned by M. Odier, with the addition of a small portion of silica and magnesia, and a slight trace of manganese. Their mode of burning, in contact with the atmosphere, I also found perfectly to correspond with our author's statements.

I took a certain quantity of the entire insects, previously reduced to a fine powder, and digested them nearly at a boiling heat in a strong solution of caustic potassa, continuing the digestion for several days, until the alkali had no further action on the residual carapace, which was then thoroughly washed, and dried at the temperature of 212° in a vessel connected with an exhausted receiver, containing a large surface of strong sulphuric acid. The last process was continued at least 48 hours, till all traces of vapour had completely disappeared, and the carapace then immediately enclosed in a well stopped phial. When used, it was again exposed to the heat of boiling water, to drive off any hygrometrical moisture it might have absorbed, (of which like most other powders it is extremely greedy) and weighed whilst warm. It was then suffered to remain in the pan of the balance till it ceased to gain weight, and the quantity of water so acquired deducted from that obtained in the analysis. A further deduction was also made for the incombustible matter contained in the carapace, and not separable by the alkali. To be certain that it was pure, at least in the view required by M. Odier, I subjected a portion to distillation in a glass tube, in the neck of which a slip of moistened turmeric paper, and another coloured blue by the juice of the *Hyacinthus non scriptus*, (an exceedingly delicate test for either acid or alkaline matter) was enclosed—neither of which suffered discoloration in the slightest degree. The carapace, thus prepared, was burnt in green glass tubes, with protoxide of copper, having some clear copper filings above the mixture, and over that a quantity of per-

fectly dry amianthus, in the admirable apparatus invented by Mr. Cooper, employing at first a very gentle heat, and gradually raising it until the part of the tube containing the carapace was bright red hot throughout, and gas ceased to come over. The tube was then carefully weighed in a very delicate balance, the water expelled by heat, and the tube weighed again. The loss of weight (deducting that of the hygrometrical water previously ascertained as stated above) gave the quantity of water formed, and consequently that of the hydrogen in the carapace. The exact volume of gas at 60° produced by the combustion was next ascertained, and the carbonic acid absorbed by caustic potassa, the volume of which gave the weight of the carbon, and that of the residual gas, after allowing for the atmospheric air in the vacant part of the tube, gave in like manner the weight of the nitrogen, its real nature not being taken for granted, but in every case ascertained by direct experiment. The difference of weight of the sum of these elements, and the quantity of carapace employed, is assumed to denote the weight of the oxygen. I made many experiments in this manner, both with peroxide, and protoxide of copper, but to avoid prolixity, I shall give the results of the two last only, made with the protoxide, premising that in all nitrogen was constantly obtained, and in pretty uniform proportion.

Exp. 1. Three grains of carapace, the necessary deductions being made for hygrometrical water and incombustible matter, were found to be equivalent to 2.072 grains of pure dry carapace, and gave, by the mode of operating described above—

| | Grs. | | Grs. |
|---------------|-------|--------------|-------|
| Carbon..... | 0.962 | or per cent. | 46.43 |
| Hydrogen..... | 0.129 | | 6.22 |
| Nitrogen..... | 0.239 | | 11.05 |
| Oxygen..... | 0.742 | | 35.81 |
| | <hr/> | | <hr/> |
| | 2.072 | | 99.51 |
| | <hr/> | | <hr/> |

Exp. 2. 4.75 grains of the same carapace, equivalent to 3.28 grains in a dry and pure state gave—

| | Grs. | | Grs. |
|---------------|-------|--------------|-------|
| Carbon..... | 1·500 | or per cent. | 45·73 |
| Hydrogen.... | 0·187 | | 5·70 |
| Nitrogen | 0·313 | | 9·54 |
| Oxygen | 1·280 | | 39·02 |
| | <hr/> | | <hr/> |
| | 3·280 | | 99·99 |
| | <hr/> | | <hr/> |

On heating the tube, to ascertain the quantity of water formed in this experiment, (in which my friend J. F. Daniell, Esq. had the goodness to co-operate) the first portions that came over exhaled a decided odour of prussic acid.

The near accordance of the preceding results entitles me to consider them as not very wide of the true composition of the substance in question. That they are absolutely accurate, in regard to the proportions of the several elements, I will not venture to assert, but I think there can be no question as to their *quality*, nor that nitrogen is essentially necessary to the composition of the carapace of insects, and consequently that M. Odier's conclusion that it rather belongs to the vegetable than the animal kingdom is erroneous.

I shall mention one more experiment.—An unweighed portion, consisting of a mixture of the elytra of the *Silpha obscura*, a carnivorous insect, *Geotrupes stercorarius*, which feeds on dung, and the *Cetonia aurata*, which feeds on vegetables, all perfectly purified by potassa, so as not in the slightest degree to change the colour of moistened turmeric paper exposed to the vapours in distillation, were burnt with peroxide of copper, merely to ascertain the quality of the gases produced. About 18 cubic inches were collected, which, after the action of potassa, left 1·35 cubic inch of nitrogen.

The Prussic acid formed in the second experiment mentioned above is an additional proof that nitrogen is an element in the composition of the carapace, being as our readers are aware a compound of carbon, hydrogen, and nitrogen.

J. G. C.

ANALYTICAL NOTICES.

BRITISH ENTOMOLOGY, or *Illustrations and Descriptions of the Genera of Insects, found in Great Britain and Ireland ; containing coloured figures from Nature of the most rare and beautiful species, and of the Plants upon which they are found.* By JOHN CURTIS, F. L. S.

The first numbers of this interesting and useful work have just made their appearance. We are not at all disposed to withhold the due proportion of approbation which we think it merits : but we must take the liberty of throwing out a hint or two, by attending to which the author is, in our opinion, more likely to ensure the success of his work, than he is by carrying it on in the same style as the first numbers. We do not complain of the execution of this work, for we think that the Entomological part of it is very elegant and we believe it to be very correct, and highly deserving of our warmest praise ; but we are far from agreeing with the author in his assertion that “a knowledge of botany is absolutely necessary in order to be able to collect insects with complete success ;” on the contrary we think that a general acquaintance with the usual plants of the country is all that an Entomologist requires ; he does not need, nor are the drawings of plants given in this work sufficient to convey to him, correct botanical knowledge ; wherefore we think the author would do better to confine himself to the entomological part of the work and to make that as complete as possible, and not to waste his own time and talent, and his subscriber’s cash on those parts that are really useless, because in themselves incomplete ; the British plants being already well known, and a knowledge of them much better attained from standard works, already in the hands of most scientific persons.

Further, we cannot help regretting that Mr. Curtis has not accompanied his English descriptions with Latin characters of each genus: could they have been added they would have rendered his work current on the continent to a much greater extent than it will be in its present form.

As an entomological work we think the one before us bids fair to become a most decided proof of the superiority of British talent.

The first number contains, tab. 1, *CICINDELA Sylvicola*; tab. 2, *VELIA Rivulorum*; tab. 3, *DEILEPHILA Euphorbiæ*; tab. 4, *PELTASTES Pini*; tab. 5, *CTENOPHORA ornata*.

The second number consists also of *five* plates representing, tab. 6, *NEBRIA livida*; tab. 7, *ODENESIS Pini*; tab. 8, *CHRYSIS fulgida*; tab. 9, *ANTHRAX ornata*; tab. 10, *NOTONECTA maculata*. We had written thus far when we observed on the wrapper of the second number a notification that the number of plates given each month is to be reduced to four, thus virtually advancing the price of the work; we are indeed concerned to observe this, for we are persuaded that it must suffer from such a measure. The author would have done a much more acceptable service to science if he had increased the number of plates as he might very well have done, by omitting these common plants, and adding another genus of insects.

A SUPPLEMENT to the Appendix of Capt. Parry's Voyage for the discovery of a north-west passage in 1819-20; containing an account of the subjects of natural history.

The articles on Mammalia, Birds, Fishes, and marine invertebrate animals, contained in this small volume are by Capt. Sabine; the land invertebrate animals by the Rev. W. Kirby; and the Shells by Mr. J. E. Gray.

Of the twelve Mammalia that are here mentioned as natives of the Arctic Regions, only one is described as a new species, namely the *Lepus glacialis* or Polar Hare, which is white, its ears longer than the head, with black lips, its tail *abbreviated*, and its claws broad, depressed, and strong; it is also smaller than the common

hare, and than the *Lepus variabilis*. It was killed in abundance on Melville Island.

Thirty-two species of birds are noticed as having been seen within the Arctic circle. The characters which distinguish the Rock Grouse, *Tetrao rupestris*, from the Ptarmigan, *Tetrao lagopus*, are distinctly stated: but not a single new species is described in this supplement. Of the eight fish that are mentioned two are described as new, and two others are noticed as doubtful. The two new species are, 1st *BLENNIUS polaris*: imberbis, pinnis anali, caudali, dorsalique, unitis: of which one individual was found on the shore of North Georgia. 2d. *COTTUS polaris*; imberbis, capite spinis duabus, operculis spinis quatuor, armatis. It appears that only six species of insects were collected in the high latitude from the beginning of September to the beginning of August, most of which are described by Mr. Kirby as new: they are 1st *BOMBYX Sabini*; cinereous wings incumbent, antennæ of the male setaceous, bipectinate at the base, with short rays. "According to the modern system this species might probably be regarded as belonging to a new genus, but the specimens are too much injured to enable me to get a clear idea of the palpi, consisting of two joints? if admitted as such it might be named *Psychophora*. From the length of the tongue it seems to come between the other *Bombycidæ* and *Noctua*, though in habit and stature it approximates to *Phalæna*, Fab. It was found in a swampy part of Melville Island." 2d. *BOMBUS arcticus*; black, with the base and apex of the thorax and the anterior half of the abdomen pale yellow. Length of the body, male 7 lines, female 11 lines. *Syn. Apis alpina* O. Fabr. *Faun. Grænl.* 155, distinct from the Linnean *Apis alpina*. 3d. *CTENOPHORA Parrii*: black, wings brownish with a white marginal spot towards the apex, surmounted by a black one, tip of the margin of the abdominal segment pale. Length $5\frac{1}{2}$ lines. 4th. *CHIRONOMUS polaris*; black, abdomen hairy, wings lacteous. Length 4 lines.

A small caterpillar and a very minute spider, added to the above, completes the list of Polar insects.

Of Invertebrate marine animals Captain Sabine mentions thirty-three, which he has arranged according to the Lamarckian system.

The unknown species he has described are 1st, *DIANÆA glacialis*; campanulata, pistillo ore quadrangulare, costis quatuor cirri-productis. Found in Baffin's Bay and the adjacent seas, but rare. 2d. *ASTERIAS polaris*; pentagona, paginâ superiore tessellato-granulata, margine articulado spinoso: a single specimen was taken by a drag net on the coast of Melville Island. 3d. *PHOXICHILUS proboscideus*; proboscide corpore duplo longiore, mandibulis nullis, palpis inungulatis: found at ebb tide on the shores of the North Georgian Islands. 4th. *IDOTEA Baffini*; linearis, antennis externis corpore longioribus, dorso spinoso, caudæ segmento ultimo elongato, apice subulato: brought up by the trawl in considerable numbers from twenty fathoms depth on the west coast of Baffin's Bay. 5th. *GAMMARUS loricatus*; rostro corniformi deflexo, dorso carinato, segmentis posticè et acute productis: in pools of water left by the ebb tide on the shores of the Polar Sea. 6th. *TALITRUS Edwardsiæ*; rostro corniformi, antennis subæqualibus, corpore ovato depresso, caudâ compressâ, tricarinatâ, spinosâ: brought up in the trawl on the western coast of Davis' Strait. 7th. *TALITRUS Cyaneæ*; capite obtusissimo, antennis subæqualibus, corpore latiore, pedibus quatuor anticis inungulatis: parasitic on the *Cyanea arctica*. 8th. *CRANGON septemcarinatus*; thorace septemcarinato; carinis serratis; pedibus secundi paris brevissimis inungulatis: taken in the trawl on the west coast of Davis' Strait. 9th. *ALPHEUS polaris*; thoracis dimidio posteriore lævi, anteriore carinato serrato; chelis et unguibus apice nigris: brought up from fifty fathoms depth on the coast of Melville Island. Of most of the above and of several other marine invertebrate animals there are apparently correct figures in the work before us.

Several new species of shells are described by Mr. Gray in this little volume; the first, namely, *Buccm. Sabinii* is probably only a variety of *Buccm. corneum*. 2d. *NUCULA arctica*. Testa ovali-elliptica, lævis, tenuis, fragilis, flavescens; latere antico lato, rotundato, postico brevi, obliquè truncato. 3d. *NICANIA crenata*; testa ovali-elliptica, virescens, concentricè sulcata; lunulâ oblongo-lanceolatâ impressa; margine crenulato. 4th. *CRASSINA arctica*; testa subrotundo-ovata, convexa. nigra, concentricè striolata; umbones subsulcati; lunula impressa ob-

longo-ovata; margine integerrimo. 5th, *ARCA glacialis*; testâ ovali-ellipticâ, tenui, villosâ, albâ, concentricè et transversim striatâ; postice rotundatâ; umbonibus approximatis; dentibus sub-obsoletis; margine integerrimo. 6th, *MODIOLA lævigata*; testa ovali-elliptica, convexa, virescens, anticè obsoletè costostriata, posticè rotundata lævigata. 7th, *PECTEN vitreus*; testa orbicularis, tenuis, hyalina, planulata, lævissima, lucida, sub-æquivalvis; auriculis subequalibus, lævibus. 8th, *BALANUS glacialis*; testâ subcylindricâ, obliquâ, albidâ, obsoletè transversim striatâ; operculo anticè profundè transversim sulcato, posticè irregulariter striato; apice acuto, inflexo.

In the paper on Rock Specimens, furnished by Mr. König, is the description of a new species of fossil Zoophyte, which he has called *Catenipora Parrii*; the following are its characters; *C. tubulis crassiusculis, compressis, collectis in laminas sinuatas varie inter sese coalitas; tubulorum orificies ovatis sæpe confluentibus; dissepimentis confertissimis*: found by Captain Parry in Prince Regent's Inlet, at the foot of a high hill;—*in transition Limestone?*

On FOSSIL SHELLS, by LEWIS WESTON DILLWYN,
Esq. F. R. S.*

THE object of this paper seems to be to draw the attention of Geologists to Fossil Shells as being the most numerous, and generally the best preserved organic remains, and consequently the most interesting for geological research. By availing ourselves of certain analogies, proved by the exact conformity in the structure of many of these fossils with living genera, Mr. Dillwyn thinks some circumstances attending the geological distribution of Fossil Shells may be observed, which have hitherto escaped notice. The principal circumstance which Mr. Dillwyn has pointed out, is the remarkable paucity of the Carnivorous Trachelipodes in the older beds, from the Transition Lime to the Lias, in which the chambered (*Carnivorous*) Cephalopoda abound: and judging from the occurrence in such great numbers of the

* Philosophical Transactions, 1823. Read June the 5th.

carnivorous Trachelipodes in the formation above the chalk, Mr. D. thinks that the vast and sudden decrease of one predaceous tribe, has been provided for by the *new creation* of many genera, and a myriad of species possessed of similar appetencies, and yet formed for obtaining their prey by habits entirely different from those of the Cephalopodes.

Small circular holes bored in shells by the predaceous Trachelipodes, so common among recent shells, and also not unfrequent among the fossils, but to be seen only in those of *tertiary* formations, suggest to Mr. D. the probability that the Aporrhaides* and other fossil Trachelipodes, that occur in secondary formations, though really carnivorous, were in the habit of feeding only on dead animals. We do not think this altogether confirmed by fact, for in the green sand, the newest (we believe) in which the Aporrhaides occur, many of the bivalves are pierced exactly in the same manner as by the carnivorous Trachelipodes: at the same time we ought to remark, that the general contents of the green sand, are such as would warrant the supposition, that its formation was anterior to the generality of tertiary formations, and posterior to the secondary, inasmuch as it contains Ammonites as well as carnivorous Trachelipodes. We think the Scientific Enquirer would be amply repaid for the trouble of pursuing the subject of Mr. Dillwyn's paper.

[The three following notices are extracted from the "Memoires de la Societé d'histoire naturelle de Paris." We reserve the account of two other papers contained in the same volume, ("On the Geology of the Environs of Antwerp," and "on the Genus *Melanopsis*," for another opportunity.]

Memoir on Branchiobdella, a new Genus of ANNELIDES of the family HIRUDINEÆ, by M. AUG. ODIER.

THE animal which forms the subject of this Memoir is parasitic, and was found on the branchiæ of the Crayfish. The generic characters assigned to it are as follows:—

* From Aporrhais, a generic name given by Petiver to the *Strombus* *Pes-Pelecani*. Linn.

Body contractile, slightly flattened, composed of seventeen rings, terminated by a prehensile disk; head oblong, furnished with two lips; mouth with two horny, triangular maxillæ, the upper one the larger; without eyes.

The situation of this genus is between *Hirudo* and *Trochetia*. It is viviparous.

Name of the species, *B. Astaci*.

B.

Memoir on ACHLYSIA, a new genus of Trachean Arachnides, by M. J. V. AUDOUIN.

THIS singular parasitical animal, discovered by M. Audouin, attached to the upper part of the abdomen of *Dytiscus marginalis* under the wings, is of an ovoid general form, very much resembling a common glass retort, with an elongated bulb, and a very short rounded neck, abruptly recurved upon the bulb, and forming a deep notch. Its colour, after having been preserved for several months in spirits of wine, was a bright yellow orange, varied with lemon yellow; its head, if indeed it exists, is not distinguished from the body: it has no eyes, nor antennæ, nor thorax, nor is the body divided into segments,—in fact, it appears to possess neither respiratory nor excretory organs: but it has six legs and a small beak (*suçoir*), behind which is placed the sternum, divided into three pairs of squarish laminæ, and may be considered as the first joints of the legs, one of which takes its rise from the upper corner of each of these square laminæ: the legs have six joints each, and are terminated by a point: the beak and legs are placed in the above-mentioned deep notch, so that when attached by its beak, the animal can only lie on one side. M. Audouin places the *Achlysia* next to *Leptus* of Latreille, and names the species *A. Dytisci*.

Explanation of Plate 4.

f. 2. Shows two specimens of *Achlysia Dytisci*, of their natural size, adhering to the abdomen of a *Dytiscus*, whose elytra and wings have been taken away to expose them.

f. 3. Profile view of the right side of an Achlysia.

f. 4. The animal opened on the side of the belly.

f. 5. Profile view of the left side of an Achlysia.

f. 6. The beak and six legs.

f. 7. Portion of the Achlysia very highly magnified : this figure shows that the beak and legs, situated at the base of the notch, had not the power of reaching to its lower orifice, and that it is only by lying on its sides, which are very compressed, that it can attach itself to external objects.

Note on the genus ASTARTE, Sowerby, (CRASSINA, Lamarck,) by M. DE LE JONKAIRE, (p. 127.)

AFTER some remarks on the strata in which the fossil species of this genus are found, a monograph is given of the whole of them, comprising four new species from the "*Calcaire grossier*;" nine from Sowerby's Mineral Conchology; and three from Brocchi (*Venus Br.*).

The author very properly retains the name given to this genus by Sowerby, long before Lamarck's work appeared,—following the genera of recent and fossil shells, by Mr. G. B. Sowerby. The names of the species enumerated are as follows—*A. Omalii*, *Corbuloides*, *Basterotii*, *Burtinea*, (Jonkaire,) *lucida*, *elegans*, *cuneata*, *plana*, *obliquata*, *lineata*, *excavata*, *planata*, *rugata*, (Sowerby), *senilis*, *incrassata*, *dysera*, (*Veneres*, Brocchi). Figures are given of the four first, and of *A. rugata*, Sow.

B.

Mineral Conchology.

THE 78th number of this work contains, Plate 444, *Astarte trigonalis*, *orbicularis* and *pumila*; Pl. 451, *Ammonites laeviusculus*, *corrugatus* and *varicosus*; Pl. 452, *Am. Turneri*; Pl. 453, *Am. rotiformis*; Pl. 454, *Am. multicostatus*; Pl. 455, *Actæon cuspidatus* and *acutus*.

Genera of Recent and Fossil Shells.

The 22d number contains *Melania*, *Melanopsis*, to which is united *Pirena* of Lam.; *Serpula* including *Spirorbis*, *Vermetus*, and *Vermilia*, Lam.; *Cassis*; and *Umbrella*; in his account of this latter genus Mr. Sowerby has explained the cause of De Blainville's mistake, which gave rise to the name *Gastrolax*, which he has applied to the animal; for he has shown that in the identical specimen examined by De Blainville, the shell has been detached from its natural situation on the back, and fixed with cement to the under part of the foot,

ART. XVII.—*Proceedings of Learned Societies on subjects connected with Zoology.*

ROYAL SOCIETY.

The first meeting of this Society for the present session took place on the 20th of November last, when the Croonian Lecture was read,

On the Anatomy of the Human Brain, as compared with that of Fishes, Insects, and Worms; by SIR E. HOME, Bart. V. P. R. S.

This lecture was very short, and consisted, principally, of remarks illustrative of the microscopical drawings by Mr. Bauer, with which it was accompanied, some more particular observations being reserved for the explanation of them. Occasion was taken to award a high and just tribute to the microscopical investigations of Swammerdam, which were unequalled by any, it was remarked, except those of Mr. Bauer. The ability of both observers was of such and so rare a nature, that, with respect to each, it had been ascribed to some particular construction of the microscope; and it had even been suspected that Swammerdam had a peculiar method of using the instrument, which had died with him.

A portion of very recent human brain, merely steeped in distilled water, was examined by Mr. Bauer, who perceived in it rows of globules proceeding in straight lines from the cortical into the medullary part. A comparison was instituted of the human brain with the same organ in fishes, insects, and worms. In the Tench, the brain has a central cavity, and its basis is nodulated. In the Bee, that organ is larger in proportion than in the other insects which have been examined ; it is also large in the Moth and in the Caterpillar.

The reading was commenced, likewise, of *Some Observations on the Migration of Birds* ; by the late Dr. EDWARD JENNER, F.R.S. ; communicated by his nephew, Mr. W. H. JENNER.

Nov. 27.—The reading of Dr. Jenner's paper was concluded.

Dr. Jenner had intended to present this paper to the Royal Society himself, but was prevented from fully completing it, as to arrangement, by his extensive correspondence on the subject of vaccination. It commenced with some general observations on the Migration of Birds, and particularly with respect to their capability of taking such great flights as migration must require, and which some writers have questioned. Dr. Jenner brought forward various facts, to show that there were no grounds for such doubt ; among which were the following : a Hobby-hawk was seen in a vessel near Newfoundland ; and an Owl, seemingly the common brown owl, flying above the Atlantic wave, with as much agility as if pursuing a mouse in the fields ; Cuckoos, Snipes, and other birds, have likewise been seen in the Atlantic ; a flock of birds resembling Linnets settled on the rigging of a ship, remained awhile chirruping in concert, and then flew away ; Geese have been caught in Newfoundland with their crops full of maize, a species of corn which is not grown but at an immense distance from that island. The discussion of this branch of the subject was succeeded by some remarks on the faculties of discrimination and guidance which must be exercised by birds, in the long flights thus taken, and which, Dr. J. conceived, must be of some peculiar and unknown nature ; Pigeons, it was observed, which have been taken several hundred miles, completely secluded from the light, by being shut up in a box, will, when set at liberty, immediately return to the place whence they were taken. The periodical dis-

appearance and return of birds has been ascribed to hybernation, but of this Dr. Jenner never witnessed an instance ; nor could he ever obtain any satisfactory evidence of it. When birds appear for the season, they are never in the emaciated and weakened state attended with loss of fat, which characterizes hybernating quadrupeds when they quit their retreats ; the birds, on the contrary, are quite vigorous, and as active as at any period. With regard to the supposed immersion of birds in ponds and rivers for the winter, Dr. J. remarked, that their respiratory organs are very similar in structure to those of quadrupeds, and are no better adapted for performing their functions under water. He took a Swift, about the 10th of August, or on the eve of its departure, and held it under water, when it died in two minutes. It has been conjectured, that repeated alternate immersions and emersions might have the effect of altering the corresponding action of the heart and lungs ; but though Swifts and Martins, it was observed, in reply to this conjecture, frequently splash in the water over which they are skimming, yet they never immerse themselves in it, and indeed if they were to do so, their wings would become so wet as to prevent their flying. The common Duck, when pursued and forced to dive repeatedly, by a water-dog, arrives at the surface again much exhausted ; as is likewise the case with Grebes and Auks, after repeated diving. Dr. Jenner had been in the habit of receiving Newfoundland Dogs from that country, and had ascertained that they never continued under water for more than thirty seconds, and even then seemed confused when they came up. It had been asserted that negro and other divers remained under water several minutes ; but Dr. J. conceived this assertion to be grounded only on a vague guess, and that the time was not accurately measured.

The next division of the paper related to the remarkable effect of instinct in birds, of their returning to build on the same spot for many successive seasons. The author took twelve Swifts from their nests in a barn, indelibly marked them all, by taking off two claws from one foot of each, and then set them at liberty. Some of them were caught again on the same spot, at the expiration of a year, and others after two years had elapsed ; they were not at-

tended to afterwards, but at the expiration of seven years from their original capture, one of these marked Swifts was brought in by a cat.

Dr. Jenner next proceeded to state, as the cause of the migration of birds, that the tumid and enlarged state of the testes in the male, and of the ovaria in the female, at the season of their departure, prompt the animals to seek those countries where they can obtain proper succours for their offspring ;—that, in fact, the nestlings are the objects of this provision. The parent birds leave the countries they migrate from at a time when their own wants are completely supplied ; and they remain in those to which they migrate, no longer than suffices for the rearing of their young. Thus the Swifts arrive in this country about the 5th or 6th of April, and depart hence about the 10th of August.—Dr. Jenner here observed, as a remarkable circumstance, that Ray, who attributed the migration of fishes to its true cause, that of seeking proper situations for spawning, overlooked the corresponding impulse as actuating birds. The Martins leave this country successively, some continuing to rear a brood much later than others : many of these birds roost in the walls of Berkeley Castle ; and Dr. Jenner found, by dissecting a number, taken at the same time, that the ovaria of the females were in a variety of states ; in some the eggs being no bigger than hemp seed, while in others they were as large as peas ; the testes of the males exhibiting analogous degrees of tumidity.

Swallows are seen flying over pools and waters in spring, in search of the gnats on which they are then obliged to feed ; and not because they have arisen from the waters. Their usual food, like that of Swifts and Martins, is a species of scarabæus, as the author ascertained by dissection.

Birds that rear several broods in the season, frequently leave the last brood to perish ; thus a pair of Swifts that had brought up three broods in one nest left the fourth to perish ; and the mother came back in the following year, threw out the skeletons, and laid in the nest again. Many nests of late birds, of various species, are deserted in this manner by the parent animals ; but the latter thus leave the country when it abounds with their own food.

The young birds, it was remarked, cannot be directed in their

migratory flights by the parents, but must be guided by some unknown principle : if it be admitted in the case of Swifts, Martins, and other birds associating together in flocks, that the young may be directed by the motions of their fellows, yet this cannot be the case with the Nightingales ; nor with the Cuckoos, who, though reared in the nests of many different birds, are regular migrators. The parent Cuckoo has left the country before its young are reared; always departing early in July.

Dr. Jenner next gave some particulars relative to the enlargement of the testes and ovaria in birds, supplementary to those which have been pointed out by Mr. John Hunter. In those birds who pair but for a short time the testes are small, while in those with whom the connubial compact is of long continuance, they are large. In the Cuckoo, a polygamist, and who continues with the female but for a very short time, the testes are of the size of a vetch only ; but in the Wren, whose attachment to his mate extends from spring to autumn, they are equal to a pea in magnitude ; thus much larger in the latter than in the former, in proportion to the size of the bird. A continued supply of generative power is required in birds who pair for a long time, in case the brood should be destroyed—but in those like the Cuckoo this provision is unnecessary.

The *winter birds of passage* leave this country for precisely the same reason that impels the *spring migrators* to come hither ; some of them, as the Wild-duck and the Wood-pigeon, which occasionally build here, are irregular in their migration ; the most regular are the Red-wing and the Field-fare, of whose building in this country Dr. Jenner never met with an instance. The food of the former, he observed, is not haws, or the fruit of the white thorn, as has been stated, but worms and insects, which they gather from the ground, feeding in flocks ; Dr. J. had seen them dying of famine when haws were abundant. A gentleman saw a flock of Field-fares on the day before the thawing of the great frost of 1794, and they seemed as wild and vigorous as if in season ; he shot one, which Dr. Jenner examined, and found to be in excellent condition, but there was no food in the stomach, and the last which the animal had eaten was digested : now as the ground was covered with snow, and as the long frost had destroy-

ed every thing they could feed on, these Field-fares must have returned here for a short time, in consequence of the inclemency of the weather abroad. Red-wings and Field-fares always leave this country when they are in the best condition. The approach of severe frost is indicated by the arrival of water-birds, as that of thaw is by the coming of the spring migrators. Birds often out-strip in their migrations the progress of the frost itself. Dr. Jenner considered that Dr. Darwin must have been mistaken in what he says respecting Cuckoos seen feeding their young. The birds in question must have been Goat-suckers, which are very easily confounded with Cuckoos by those who are not fully conversant with the characters of their plumage, &c.

This very interesting paper concluded with a recapitulation of the principal facts contained in it, and of the author's views respecting them.

Dec. 11.—A paper was communicated, *On the Nature of the Acid and Saline Matters usually existing in the Stomachs of Animals*; by WILLIAM PROUT, M.D. F.R.S.

The object of this paper was to prove, that the acid usually found to exist in the stomach of animals during the digestive process is the muriatic acid, and that the saline matters consist chiefly of the alkaline muriates.

The method adopted by the author to prove this, was to digest the contents of the stomach of a rabbit, or other animal, in distilled water as long as they imparted any thing to that fluid. The solution was then divided into four equal portions. The first of these was evaporated to dryness in its natural state, and the residuum burnt, by which means the muriatic acid in union with a *fixed* alkali was ascertained. Another portion was super-saturated with potash, evaporated to dryness, and burnt as before, and thus the *total* quantity of muriatic acid present determined. A third portion was exactly neutralized with a solution of potash of known strength, which gave the proportion of *free* acid present. A fourth portion was reserved for miscellaneous experiments. From the results thus obtained, checked by others, the author was enabled to ascertain the proportion of muriatic acid present, whether in union with a fixed or volatile alkali, or in an unsaturated state;

and the quantity in the latter state was always found to be considerable, and in some instances greater than the quantity in combination. Dr. Prout obtained similar results in different animals, as well as in the human subject, and in one instance, from twenty ounces of fluid ejected from the human stomach, in a severe derangement of that organ, he found upwards of half a drachm of muriatic acid of specific gravity 1.160.

January 29, 1824.—A Paper was communicated by Sir E. Home, entitled "*Observations on the Iguana tuberculata, or common Guana* ; by THE REV. LANSDOWN GUILDING, B. A. F.L.S."

This paper commenced with some remarks on the necessity in zoology of describing animals from living specimens ; in consequence of inattention to which, naturalists had committed various errors in describing the characters of certain lizards, particularly in representing their gular process as a pouch capable of dilatation. The principal object of Mr. Guilding's observations on the Guana, was briefly to describe an organ on the parietal bones of the head of that animal, to which he gives the appellation of *foramen Homianum*, in honour of Sir E. Home. It does not afford a passage to any nerve or blood-vessel.

Mr. G. proposed, should it be acceptable to the Royal Society, to lay before that body a general anatomical account of the Saurian reptiles of the Antilles.

LINNEAN SOCIETY.

THE first meeting of this Society, after the summer recess, took place on the 4th of November, 1823. Among the presents then received, were specimens of 85 species of birds, which had been sent from the East Indies by Major General Hardwicke, F. R. and L. S. ; together with a curious species of Musk Rat ; and the head of *Antilope quadricornis*, (the Chikara of Bengal,) General Hardwicke's description of which had been read to the Society, on the 17th of the preceding June.

The papers read were as follows :

A description of the Swallow-tailed Falcon, *Falco furcatus*,

Linn. ; taken near Hawes, in Wensley Dale, Yorkshire, in 1805 ; and

A Description of a Bird, supposed to be the *Rallus pusillus* of Latham, shot at the same place in 1807 ; by W. Fothergill, Esq. ; communicated by Dr. Sims.

Observations on the Genus *Onchidium* of Buchanan, with a description of a new Species ; by the Rev. Lansdown Guilding, B. A. F. L. S.

In these observations Mr. Guilding gives the following improved generic character of *Onchidium* ; Class *Mollusca* ; Ord. *Cephala* ; Div. *Gasteropoda* : “ Corpus oblongum, repens, sub-tus planum. Penula carnosa pedem totum tegens. Os anticum, longitudinale. Anus posticus, infra. Tentacula duo, retractilia. Oculi terminales” He enumerates six species ; one of them a new one, and thus characterized : “ *O. occidentale* dorso fusco, atomis brunneis elevatis sparsis, ventre pallido, lateribus livido-maculatis, brachiis apice divisis.” Found in moist places in the mountainous parts of St. Vincent’s.

November 18.—The reading was commenced of a paper, entitled “ Experiments and Observations on the Light and Luminous Matter of the *Lampyrus noctiluca*, or Glow-worm ; by John Murray, F. L. S.” &c.

December 2.—The reading of Mr. Murray’s paper was continued.

December 16.—The reading of Mr. Murray’s paper was concluded ; and the following communications were likewise read.

Observations on some of the terrestrial Mollusca of the West Indies ; by the Rev. Lansdown Guilding.

Among the species described in this paper were *Helicina occidentalis*, corpore livido, dorso tentaculisque atris, oculis prominulis ;—in montibus sylvosis Sancti Vincentii. *Bulimus hæmastomus*, corpore olivaceo-nigro, corrugato : pede subtus pallido : capite bifariam crenato ; in dumetis Antillarum. *Bulimulus stramineus*. *Pupa undulata*.

An Account of some rare West Indian Crabs ; also by Mr. Guilding.

January 20, 1824.—At this meeting a collection of Birds, in-

cluding several species of Gull, and among them *Larus Sabini*, with a skull of the Walrus, *Trichecus rosmarus*, were presented by Mr. Mogg, one of the companions of Captain Parry, in his late voyage. A specimen of *Siren lacertina*, and one of a new species of *Cyprinus viviparus*, were also presented by Don Vincente de Cervantes, Professor of Botany in the University of Mexico.

A paper was read, on a new species of the genus *Gadus*; by Mr. Jonathan Couch, of Polperro, in Cornwall. This diminutive species, called by fishermen the Mackarel Midge, is only an inch and a quarter in length; its proportions are nearly those of the Whiting.

The Zoological Club of the Linnean Society, the institution of which we have recorded below, communicated a paper, On the Natural Affinities that connect the Orders and Families of Birds; by N. A. Vigors, Esq. M. A. F. L. S.

February 3.—The reading of Mr. Vigors' paper was resumed and continued.

ZOOLOGICAL CLUB.

THE first meeting of this Association, the establishment of which has been for some time contemplated, was held in the apartments of the Linnean Society, on the 29th of November last, the birth-day of our celebrated countryman, John Ray. The Club is composed of members of the Society devoted to the study of Zoology and Comparative Anatomy, and has been organized with the view of advancing the knowledge of those Sciences, in all their branches, under the sanction of the Society. The Club will not have any publications of their own, but will submit all original communications made to them to the Council of the Linnean Society, to be dealt with as are other communications made to that body.

Before the Club proceeded to the election of their officers and other business of the day, an admirable opening address, explanatory of the views of the Association, was delivered by the Rev. W. Kirby, F. R. and L. S., who had been unanimously called to the chair. The following members were then appointed to form the committee and officers, for the management of the affairs

of the Club for the ensuing year ; Joseph Sabine, Esq. *Chairman* ; J. F. Stephens, Esq. *Treasurer* ; N. A. Vigors, Esq. *Secretary* ; Rev. W. Kirby, A. H. Haworth, Esq., Thomas Horsfield, M.D., Thomas Bell, Esq., E. T. Bennet, Esq., and G. Milne, Esq.

The meetings of the Zoological Club, at which all the members of the Linnean Society are entitled to be present, are held in the Society's apartments in Soho Square, at eight o'clock in the evening, on the second and fourth Tuesdays of every month, throughout the year.

GEOLOGICAL SOCIETY.

November 7.—A letter was read, dated May 10, 1823, from George Cumberland, Esq. Hon. Mem. G.S., “On a Fossil of the Chalk,” accompanied by a drawing.

A letter was read, dated July 14, 1823, from the same gentleman, “On a new species of *Encrinus* found in the Mountain Limestone, near Bristol.”

November 21.—An extract of a letter was read from the Rev. Lansdown Guilding, F. L. S. M. G. S. containing “An Account of a Fossil found in the Blue Lias at the Berkeley Canal, near Gloucester,” accompanied by the fossil.

A paper was read, “On the Lias of the Coast in the vicinity of Lyme Regis, Dorset, by H. T. De la Beche, Esq. F. R. & L. S. M. G. S. ; to which is subjoined an account of the various fossil shells, and other organic remains found in the lias, accompanied with several descriptive drawings.

ART. XVIII. *Scientific Notices.*

LINNEAN SOCIETY OF CALVADOS.

We have the pleasure of announcing the formation of a new Association, at Caen in Normandy, for the express purpose of studying the Natural History of the Department, under the title of *SOCIÉTÉ LINNÉENNE DU CALVADOS.* We rejoice in the forma-

tion of this Society, as an evidence that the love of *our favourite science*, is becoming every day more and more extended. We are of opinion that such associations, if conducted in a liberal and open manner, are beneficial to Society, and to Science in particular, because we think that the knowledge of the works of the great Creator is yet in its infancy among men, how considerable soever the progress already made in such knowledge may be. Nearly contemporaneous with "*The Linnean Society of Calvados*," is "*THE ZOOLOGICAL CLUB OF THE LINNEAN SOCIETY OF LONDON*," of which we have already taken notice in a former page. As well wishers to the extension of the delightful study in which we are engaged, we congratulate the students in Natural Science upon their formation, and sincerely hope that their success may be commensurate with the talent and wishes of the Founders.

ETHERIA.—*Lam.*

WITH reference to the first number of Sowerby's *Genera of Recent and Fossil Shells*, where he has given his reasons for supposing that the Etheria might prove to be a fresh-water shell, we have to state that M. Cailliaud has discovered this shell in considerable abundance in the Nile, in the kingdom of Senaar, thus verifying Mr. G. B. Sowerby's conjectures. It appears also that, from an examination of specimens brought from thence by M. Cailliaud, M. De Ferussac has ascertained that what are described by M. de Lamarck as four distinct species, should rightly be considered only as two species and their variations. The principal distinguishing character between Etheria and Ostrea, consists in the two lateral muscular impressions of the former.

ACCENTOR ALPINUS.

A female of this bird has been shot lately in the garden of King's College, Cambridge; it is now preserved in the Rev. Dr. Thackeray's collection of British birds.

PLESIOSAURUS.

OF the Saurian reptiles, the remains of which abound in the secondary strata in this country, the *Plesiosaurus* is unquestionably one of the most interesting; we are informed that several skeletons of this extraordinary animal have been taken up lately; one of them in so perfect a state as to enable Mr. Conybeare to determine with a certain degree of precision the general form and characters of the skeleton of the animal: we shall only now mention the great length of its neck, in consequence of the extraordinary number of cervical vertebræ, amounting, perhaps, to forty, a number far exceeding any thing that has hitherto been observed in any class of animals.

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THE
ZOOLOGICAL JOURNAL.

June, 1824.

ART. XIX. *Monograph on the Cypræidæ, a Family of Testaceous Mollusca. By Mr. JOHN EDWARD GRAY.*

[Continued from page 80.]

6. *Cypræa stercoraria*; var. *Rattus*: its synonymes continued.
Icon. *List. Conch.* 680, f. 35 (3)! *Gualtier* t. 15, f. F.
Ency. Method. 351, f. 4!

1. *Junior*.

Cypræa fasciata. *Chemnitz* x. 100, *Gmelin* 3406. *Schreiber's Conch.* t. 61.

Cypræa gibba. *Gmelin* 3403.

Icon. *List. Conch.* t. 663, f. 7. *Chemnitz* x, t. 144, f. 1334.

2. *Decorticata*.

Cypræa cauteriata. *Chemnitz* x. 100, t. 144, f. 1332.

Cypræa, — *Chemnitz* x. 100, t. 144, f. 1333.

3. *Distorta*, lateribus tuberculatis.

Icon. *Born. Mus.* t. 8, f. 1.

Inhabits West Indian Seas, African Ocean, and Jamaica;
Lamarck, *Lister*: Coast of Guinea, *Schroeter*. *Mus. Brit. J.*
Sowerb. Nost.

Shell ovate, ventricose, rather gibbose, pale yellowish, spotted and clouded with fulvous brown, and with a black brown spot at the side of the spire, marked with a rather irregular pale dorsal line, base flat, livid brown, sides thickened, rather produced at the extremities, especially the hinder ones, rather angular; livid, spotted with blackish brown; aperture dilated and concave in front,

138 *Monograph on the Cypræidæ, by Mr. Gray.*

brown; teeth narrow, white; columella front very deeply concave, deep, plaited; spire prominent, conical, convex; inside purplish white.

7. *Cypræa Scurra.*

Testa oblongo-elliptica, subcylindrica, albido-cærulescens, lineolis fulvis, reticulatis, ornata; lineâ dorsali rectâ, simplici; basi flavescens; lateribus subincrassatis fusco-maculatis, rotundatis; dentibus minutis fuscis.

Cypræa Scurra. Chemnitz x. 103. Gmelin 3409. Lamarck Ann. Mus. xv. 450. Hist. viii. 380. Dillwyn R. S. 452.

Cypræa indica. Gmelin 3412. (1).

Icon. Rumphius Mus. t. 39, f. II. (1). Martini j. t. 27, f. 276, 277! Chemnitz x. t. 144, f. 1338, a. b! Ency. Method. 353, f. 3!

β. decorticata. Testa violacea sub-fasciata; marginibus pallidis fusco-punctatis.

Indian Ocean, Eastern Ocean; Chemnitz. Mus. Brit. J. Sowerb. Nost.

Shell oblong elliptical, nearly cylindrical, blueish white, very obscurely banded, ornamented with fulvous lines, forming a beautiful kind of net-work, leaving angular meshes; the dorsal line is simple, straight, nearly central; the edge is slightly thickened, rounded, yellowish, with small blackish spots, slightly produced at the extremities; the base is flat with a small depression shelving towards the aperture, on the middle of the inner lip; the aperture is linear, rather broader at the front extremity; the teeth are small, rather close, pale brown; columella plaited deep, front concave, spire conical, covered with the margin, inside purplish; axis $1\frac{1}{2}$, diameter $\frac{3}{4}$ of an inch.

Is remarkably like *C. arabica* in marking, but may be always distinguished from it by its rounded sides, subcylindrical form, and small teeth.

8. *Cypræa testudinaria.*

Testa oblongo-elliptica, subcylindrica, albido-fulvo-castaneoque nebuloza, punctulis albidis furfuraceis adspersa, basi fuscâ dentibus albis.

Cypræa testudinaria. *Lin. Sys. Nat.* 1173! *Martini* j. 354. *Schroet. Einl.* j. 98. *Born. Mus.* 175. *Gmelin* 3399. *Schreiber's Conch.* j. 55. *Lamarck. Ann. Mus.* xv. 448. *Hist.* vii. 376. *Dillwyn R. S.* 440.

Icon. List. Conch. t. 689, f. 36! *Rumphius* 38, f. C. *Pet. Amb.* t. 8, f. 7. *Knorr.* iv. t. 27, f. 2. *Favanne Conch.* t. 30, f. O. *Martini* j. t. 27, f. 271, 272! *Shaw Nat. Misc.* t. xviii, f. 734! *Ency. Meth.* t. 351, f. 2!

β. decorticata. Testa pallide fusca, obscure trifasciata, lateribus fuscis castaneo-maculatis.

Inhabits the Indian Ocean, Persian Gulph; *Linneus*. Amboyna, *Rumphius*. Ceylon, *Humphreys*. *Mus. Brit.* Sowerb. Nost.

Shell oblong elliptical, nearly cylindrical, whitish, clouded and spotted with chesnut brown, and minutely speckled with very small white impressed dots; the base pale brown, shelving towards and concave about the middle of the aperture; aperture whitish, front rather wider, concave; teeth small, close, white; columella plaited, deep, with a large concavity in front; spire conical, convex, partly covered, inside white; axis 4 and $\frac{1}{2}$, diameter 2 and $\frac{3}{4}$ inches.

9. *Cypræa exanthema*.

Testa oblongo-elliptica, subcylindrica, fulva subtrifasciata, maculis albidis, rotundis, subocellatis, sparsis, ornata; lineâ dorsali simplici, subcentrali; basi, lateribusque immaculatis, rotundatis; aperturâ angustâ; dentibus fuscis; columellâ profunde impressâ.

α. Testa oblonga elliptica, fulva, maculis ocellatis; linea dorsali subcentrali; apertura angusta, columella antice profunde impressa.

Cypræa exanthema. *Lin. Syst. Nat.* 1172? (1). *Martini* j. 368. *Born. Mus.* 172. *Schroeter Einl.* j. 94. *Gmelin* 3397. *Schreiber's Conch.* t. 52. *Lamarck Syst. des Anim.* 71. *Ann. Mus.* xv. 447! *Hist.* vii. 375. *Dillwyn R. S.* 437.

Cypræa Leucopis. *Shaw, Nat. Misc.*

Icon. Bonanni Rec. iii. f. 257. *Kirch.* f. 256. *List. Conch.* t. 698, f. 45! t. 699, f. 46! *Pet. Gaz.* t. 153, f. 11. *Seba* iii. t. 76, f. 4, 5, 16, 18. (1). *Knorr.* ii. t. 24, f. 2. *Ency. Method.* t. 349, f. d. c.

1. *Junior*. Testa oblongo-ovata plumbea, sub 5-fasciata.

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Ency. Method. t. 349, f. a. b. ! *Martini* ii. t. 65, f. 730.

2. *Incompleta*. Testa oblongo-elliptica, plumbea fasciata, basi pallide subocellatâ.

Cypræa zebra. *Lin. Sys. Nat.* 1174. *Born. Mus.* 177. *Schroeter Einl.* t. 101. *Gmelin* 3400. (2).

Cypræa plumbea. *Gmelin* 3403. *Schreiber's Conch.* t. 60.

Cypræa bifasciata. *Gmelin* 3405. (3). *Schreiber's Conch.* t. 58.

Cypræa dubia. *Gmelin* 3405. (4). *Schreiber's Conch.* t. 116.

Icon. Lister Conch. t. 669, f. 15. *Bonanni Rec.* iii. f. 266. (2). *Kirch.* iii. f. 265. *Gualtier* t. 16, f. O. *Argenville Conch.* t. 10, f. G. (2). *Seba* iii. t. 76, f. 16. (4). *Martini j.* t. 26, f. 256. *Favanne* t. 29, f. b. 2. *Born.* t. 8, f. 3. (3). *Schroeter Einl.* t. 1, f. 6. *Shaw Nat. Misc.* xiv. t. 593. *Ency. Method.* t. 349, f. c.

β. angustata. Testa elliptica, cylindrica, maculis parvis ocellatis.

Icon. Favanne t. 29, f. B. 1.

10. *Cervina*.

Testa ovata, ventricosa, tenui, fulvo-fusca, maculis parvis, sub ocellatis; lineâ dorsali laterali; aperturâ amplâ; columellâ lævigatâ, antice parum impressâ.

Cypræa Cervus. *Lin. Mantissa* 548. (1). *Lamarck Ann. Mus.* xv. 447.

Cypræa exanthema. *Chemnitz* x. 108.

Cypræa oculata. *Gmelin* 3403. (2).

Cypræa Cervina. *Lamarck Hist.* vii. 375.

Icon. Lister Conch. t. 697, f. 44. (2). *Bonanni Rec.* iii. f. 267. (1) (2). *Kirch.* f. 266. (2). *Knorr.* j. t. 5, f. 3, 4. *Regenfuss.* t. 10, f. 38. (1). *Martini j.* t. 26, f. 257, 258. *Chemnitz* x. t. 145, f. 1343. *Ency. Method.* t. 351, f. 3.

Incompleta. Testa plumbea immaculata.

American and Atlantic Ocean, Coast of Jamaica, *Lister*. Caribbee Islands, *Regenfuss*. Santa Cruz and St. Thomas, *Martini. Mus. Brit.* Sowerb. Nost.

Shell, oblong elliptical, nearly cylindrical, fulvous, obscurely banded, ornamented with roundish white spots, which are mostly eyed with a round brown pupil, especially at the sides; dorsal line simple; edge scarcely thickened, rather convex; base shelving

toward the aperture ; aperture largish, front rather dilated ; teeth brown, rather distant ; columella deep, front concave ; spire prominent, conical, convex, partly covered ; inside violet.

This shell offers two very distinct varieties, which have been considered as species by most, but they run very closely into one another.

In one, 1. The shell is subcylindrical, fulvous, the spots are most of them eyed, and the dorsal line is nearly central ; the aperture is not very wide, the base front of the columella is distinctly concave ; this is the *Exanthema* of most authors, but I am not certain that it is of Linneus, which he compares to *Mappa*, and it does not agree well with his character ; the first figure which he refers to is certainly *C. Arabica*, and the next he has referred to is *C. Cervus* in his Mantissa, and the last is this species ; the other variety 2. is the *C. Cervus* of Linneus, where the shell is ovate, elliptical, ventricose, thin, fulvous brown, with the spots usually small, and rarely eyed, the dorsal line is on the side, the mouth is very wide, and the front of the columella is scarcely concave.

11. *Cypræa Argus*.

Testa oblongo-elliptica, subcylindrica, subumbilicata, albido-flavescens obscure trifasciata, annulis fulvis ornata ; basi lateribusque albidis ; subtus fusco quadri-maculata ; dentibus albidis fusco marginatis.

Cypræa Argus. *Lin. Syst. Nat.* 1173. *Martini* j. 365. *Schroet. Eintl.* j. 97. *Born. Mus.* 174. *Chemnitz* x. 109. *Gmelin* 3398. *Schreiber's Conch.* j. 54. *Shaw Nat. Misc.* *Lamarck Ann. Mus.* xv. 448. *Hist.* vii. 376. *Dillwyn R. S.* 440.

Icon. *Bonanni Rec. & Kirch.* iii. f. 263. *Lister Conch.* t. 705, f. 54 ! *Rumph.* t. 38, f. D. *Pet. Gaz.* t. 97, f. 6. *Amb.* t. 5, f. 9. *Gaultier* t. 16, f. T. *Klein ost.* t. 6, f. 101. *Knorr.* iii. t. 11, f. 5. *Regenfuss* t. 5, f. 57. *Favanne* t. 29, f. B. 2. *Martini* j. t. 28, f. 285, 286. *Chemnitz* x. t. 145, f. 1344, 1345. *Shaw Nat. Misc.* xv. t. 619. *Ency. Method.* t. 350, f. 1.

2. *Decorticata*. Testa pallide fusca trifasciata.

β. *ventricosa*. Testa ovata elliptica.

Indian Ocean, Amboyna, *Rumphius*. Madras, Java, Borneo,

Petiver. African Ocean, *Linneus.* Coast of Guinea, *Regenfuss.* Mus. Brit. Sowerb. Nost.— β . N. A. Vigers.

Shell oblong elliptical, nearly cylindrical, pale yellowish white, obscurely three-banded, ornamented with many variously sized fulvous rings; sides pale, scarcely thickened; base pale, whitish, shelving toward the aperture, marked with two large chesnut brown, squarish spots on each side; aperture rather larger in front, teeth smallish, close, pale, with a brown edge on each side; columella deep, front concave, plaited; spire small, concave; inside white; axis $2\frac{1}{2}$, diameter $1\frac{1}{4}$ of an inch.

12. *Cypræa Talpa.*

Testa oblongo-elliptica, subcylindrica, subumbilicata, flavescent, obscure trifasciata; basi lateribusque fusco-nigris; marginibus subincrassatis, subangulatis; aperturâ pallidâ, dentibus nigris.

Cypræa Talpa. *Lin. Sys. Nat.* 174. *Martini* j. 356. *Born. Mus.* 177. *Schroeter Einl.* j. 102. *Gmelin* 3400. *Schreiber's Conch.* j. 56. *Lamarck Ann. Mus.* xv. 453. *Hist.* 383. *Dillwyn R. S.* 442.

Icon. *List. Conch.* t. 658, f. 114! *Rumphius* t. 38, f. 1. *Pet. Amb.* t. 16, f. 1. *Gualtier* t. 16, f. N. *Argenville* t. 18, f. H. *Knorr.* j. t. 27, f. 2, 3. *Regenfuss* j. t. 10, f. 37. *Favanne* t. 29, f. 6, 1. *Martini* j. t. 27, f. 273, 274. *Ency. Method.* 353, f. 4.

2. *Decorticata.* Testa flavo-basi fulvo-fuscâ.

Inhabits the Indian Ocean, Madagascar, *Lister.* Amboyna, *Rumphius.* Coast of Guinea, *Regenfuss.* Asia, *Linn.* China, *Humphreys.* Mus. Brit. J. Sowerb. Nost.

Shell oblong elliptical, nearly cylindrical, yellowish, obscurely banded; base and sides very dark brown black; the edge thickened, slightly angularly margined, especially at the extremities; aperture rather narrow, yellowish, teeth narrow, distinct, black; columella smooth, front concave, slightly plaited; spire flat; inside purplish white; axis $2\frac{1}{2}$, diameter $1\frac{1}{4}$ of an inch.

13. *Cypræa Isabella.*

Testa oblonga elliptica, subcylindrica, cinereo-fulva, obscure fasciata, lineolis punctulisque nigris, ornata; basi lateribusque albis; extremitatibus aurantio maculatis, dentibus minutis albis.

Cypræa Isabella. *Lin. Sys. Nat.* 1177! *Martini* j. 357. *Born. Mus.* 183. *Schroeter Einl.* j. 113. *Gmelin* 3409. *Schreiber's Conch.* j. 65. *Lamarck, Ann. Mus.* xvi. 94. *Hist.* vii. 390. *Dillwyn R. S.* 451.

Icon. Lister Conch. t. 660, f. 4! *Rumphius* t. 39, f. G. *Petiver Amb.* t. 16, f. 16. *Argenville* t. 18, f. P. *Knorr.* iv. t. 9, f. 5. *Martini* j. t. 27, f. 275. *Ency. Method.* 355, f. 6.

2. *Decorticata*. Flava, obscure fasciata; basi albâ; extremitatibus luteis.

Asiatic Ocean, Madagascar, and Mauritius, *Lister*. Amboyna, *Rumphius*. Red Sea, *Lord Valentia*. *Mus. Brit. J. Sowerb. Nost.*

β. *fulva*. Testa fulvo-flavescens, pellucida; extremitatibus aurantiis. *Mus. Dom. Mawe*.

Shell oblong elliptical, nearly cylindrical, grayish fulvous, obscurely three-banded, ornamented with small transverse black lines and very small spots; side white, scarcely margined, rounded; extremities rounded, orange yellow; base flat, with a concavity near the centre of the inner lip; aperture narrow, linear, scarcely wider in front, teeth small, close, blunt; columella smooth, front slightly concave, smooth, innermost edge denticulated; spire small, flat; inside white; axis $1\frac{1}{4}$, diameter $\frac{3}{4}$ of an inch.

When rubbed, it is plain yellow with three obscure bands. Mrs. Mawe pointed out to me a specimen brought from the Red Sea, by Lord Valentia, that is pellucid yelk yellow.

14. *Cypræa pulchella*.

Testa oblongo-elliptica, subcylindrica, pallide fusca, obscure trifasciata; basi lateribusque roseis; marginibus incrassatis rotundatis; extremitatibus nigro bimaculatis; apertura angusta, dentibus fuscis minutis.

Inhab. Red Sea, Lord Valentia. *Mus. Dom. Children, Mawe, et Goodall*.

Shell oblong elliptical, nearly cylindrical, very pale brown, with three obscure broad bands, and two dark blackish-brown spots at each extremity; base and sides rose-coloured; margin thickened, rounded, slightly prominent in the front; base flattish, with a concavity near the centre of the inner lip; aperture

narrow, scarcely dilated in front; teeth small, blunt, close, brown, the brown line extending into the concavity on the base; columella smooth, front concave; spire rather prominent, covered; inside whitish; axis $1 \frac{1}{4}$, diameter $\frac{7}{10}$ of an inch.

This species, which has the form and aperture of *C. Argus*, and the colour and marking of *C. lurida*, was first pointed out to me by Mrs. Mawe, in her private cabinet, and I have since observed it in the well selected cabinet of Miss Children.

15. *Cypræa controversa.*

Testa ovato-elliptica, subcylindrica, pallide albido-cinerea, vel cornea, obscure trifasciata; basi lateribusque albidis; marginibus subincrassatis rotundatis, extremitatibus luteo, fusco, seu nigro bimaculatis; aperturâ dentibusque albis, dentibus minutis.

Inhabits. — Mus. Crouch, Nost.

Shell oval or oblong, elliptical, nearly cylindrical, gradually raised towards the anterior extremity, very pale whitish flesh colour, or gray, with three obscure bands, and speckled with irregular white impressed dots; base rather convex, subcylindrical, white, margin rather thickened, white or greyish, with a yellowish line where it joins the body of the shell, slightly produced, and rounded at the two extremities; extremities brownish yellow, marked with two large brown spots, the anterior ones of which are sometimes influent, and form one dark brown crescent; Aperture scarcely dilated in front, teeth small, distant, white; columella smooth, front concave, slightly denticulated on the innermost part; spire impressed, covered; inside purplish white; axis $\frac{45}{10}$, diameter $\frac{8}{10}$ of an inch.

This shell varies considerably in shape and ground colour, in the two specimens which I have seen, the first being oval elliptical, whitish, and the other oblong elliptical, flesh-coloured; but the colour of the extremity, base, speckles, and spots, was the same in both, and it is from these characters alone that it can be separated from *C. lurida*, to which it has very great affinity, and may perhaps prove only a variety, but I have agreed with several of my friends in considering it as a species.

It was to the kindness of Mr. Crouch, well known for his

spirited lithographic conchological prints, that I am indebted for the knowledge of this shell; but I have since procured a second specimen, and it may not be rare, as I have heard of two or three others, one of which is in the collection of Mr. J. F. Stephens.

16. *Cypræa lurida*.

Testa ovalo-ovata, albido-cinerea, lurida fusca, late quadri-fasciata; basi subconvexâ carneâ; lateribus incrassatis, pallide fuscis; extremitatibus luteis, nigro bimaculatis; aperturâ dentibusque albis.

Cypræa lurida. *Lin. Sys. Nat.* 1175! *Martini* j. 386. *Born. Mus.* 178. *Schroeter Einl.* j. 103. *Gmelin* 3401. *Schreiber's Conch.* 57. *Lamarck Ann. Mus.* xvi. 89. *Hist.* iii. 384! *Dillwyn R. S.* 443!

Icon. *Bonanni Rec.* iii. f. 251. *Kirch.* iii. 250. *Lister Conch.* t. 671. 17! t. 673. 19! *Gualtier* t. 13, f. E. I. *Argenville* t. 18, f. C. *Adanson* t. 5, f. D. *Favanne* t. 29, f. C. 4. *Martini* j. t. 30, f. 315! *Ency. Method.* t. 354, f. 2.

2. *Decorticata*. Testa nigro-fusca; lateribus fuscis.

Inhabits the Atlantic Ocean, Isle of Ascension, *Lister*. Sicily, *Bonanni*. Senegal, *Adanson*. Brazil, *Martini*. Naples, *Aldrovand*. Adriatic Sea, *Brocchi*. *Mus. Brit.* *Sowerb.* *Nost.*

Shell ovate, bluish white, with four broad livid brown bands, (only allowing two or three narrow pale bands to appear); base rather convex, flesh-coloured; margin thickened, pale brown, slightly produced and margined, especially at the two extremities, which are pale yellowish, and marked with two largish brown spots; aperture scarcely dilated in front; teeth small, distant, white; columella smooth, front concave, with the innermost part slightly denticulated; spire small, convex; inside purplish white; axis $1\frac{1}{2}$, diameter 1 inch.

Varies considerably, 1st. in shape, being more or less oval or elliptical, and in the margin, being more or less thickened; 2nd in the distinctness of the bands.

17. *Cypræa cinerea*.

Testa subovato-elliptica, cinerea, obscure trifasciata; basi albidâ

convexâ ; marginibus incrassatis rotundatis, pallide cinereis, punctulis nigris notatis ; aperturâ sub cinereâ, dentibus albis.

Cypræa cinerea. *Gmelin* 3402 ! *Schreiber's Conch.* j. 58. *Lamarck Ann. Mus.* xvi. 90 ! *Hist.* vii. 386. *Dillwyn R. S.* 451 !

Cypræa cincta. *Solander's Mss.*

Cypræa n. 6. *Schroeter Einl.* j. 134.

Porcellana trifasciata. *Mus. Gevers.* 402.

Cypræa sordida. *Lamarck Ann. Mus.* xvi. 91 ! *Hist.* vii. 387.

Cypræa Vanelli Junior. *Dillwyn R. S.* 443 !

Icon. Lister Conch. 667. f. 11 ! 668. f. 13. *a. b. ?* 670. f. 16 ! *Gualtier t.* 16. f. 16. *H. M. Martini t.* 25. f. 254. 255 ! too blue.

β. fulva. Testa pallide fulva ; marginibus albis.

γ. decorticata. Testa pallide rufosca obscure trifasciata ; basi marginibusque albis.

Inhabits the West Indian Ocean, Barbadoes, Jamaica, Lister. Mus. Brit. J. Sowerb. Nost.

Shell ovate, or ovate elliptical, grayish, with three obscure broad darker bands ; the margin thickened, rounded, pale brownish grey, ornamented with scattered irregular very small black specks ; base white, convex ; aperture rather narrow, reddish gray, especially in the centre of the inner lip ; teeth small, distant, blunt, white ; columella smooth, front concave, innermost part slightly denticulated ; spire small, convex, mostly covered ; inside white : axis $\frac{13}{10}$, diameter $\frac{8}{10}$ of an inch.

Varies very much ; 1stly, in shape, being ovate, ventricose, or ovate elliptical, and even subcylindrical. 2ndly, in colour, being pale grayish, fulvous, or brown, but always pale ; where worn pale reddish brown, dull ; and 3rdly, in size, from $\frac{3}{4}$ to 2 inches long.

I have a half fossilized specimen of this species, which is white, semi-pellucid ; dug out 40 feet below the surface on the coast of (Honduras?) from amongst Tupha, given me by Mr. G. B. Sowerby.

This species has been very much confused. Lamarck formed two from it, and Dillwyn had it twice over with the same synonyma, and again as a variety of *C. Carneola*.

18. *Cypræa Carneola*.

Testa oblongo-elliptica, pallide fusca, fasciis quatuor incarnatis ornata; basi subcylindricâ; lateribus subincrassatis, arenoso-cinereis, aperturâ dentibusque violaceis.

Cypræa Carneola, *Lin. Syst. Nat.* 1174! *Martini* j. 366. *Schroeter Einl.* j. 100. *Born. Mus.* 176. *Gmelin* 3400. *Schreiber's Conch.* 56. *Lamarck Ann. Mus.* xv. 454. *Hist.* 384. *Dillwyn R. S.* 442.

Cypræa crassa, *Gmelin* 3421 (?)

Icon. Lister Conch. t. 664. f. 8! (2) *Rumphius* 38. f. K. *Petiver Gaz.* t. 80. f. 8. *Gualtier* t. 30. f. H. *Argenville* t. 18. f. O. *Knorr* vi. t. 17. f. 4. *Favanne* t. 29. f. b. 5. *Martini* 1. t. 28. f. 287. 288! *Born. Mus.* t. 8. f. 2.

2. *Incompleta*. Testa sub marginata, *Lister Conch.* t. 665. f. 9.

Inhab. East Indian Ocean, *Humphreys*? Amboyna, *Rumphius*? Asia, *Linneus*. Madagascar, *Lister. Mus. Brit.* Sowerb. Nost.

Shell, oblong elliptical, pale brown, with four broadish dark flesh coloured bands; margin thickened, sub-angular, mottled, sandy, grey; base pale, whitish, brown, sub-cylindrical, shelving outwards; aperture rather wide, scarcely wider in front; teeth blunt, violet; columella plaited, front rather concave; spire hid; inside white; axis 2 inches, diameter $1\frac{1}{4}$ of an inch.

It varies greatly in size but keeps pretty constant to shape.

Dillwyn has considered *C. sordida* of *Lamarck* as a variety of this instead of as the type of *C. cinerea*.

19. *Cypræa arenosa*.

Testa ovalo-ovata, sub-ventricosa, pallide fusca, quadrifasciatâ; basi convexâ; marginibus incrassatis, angulatis, supra arenoso-cinereis, aperturâ dentibusque minutis, albis.

Inhabits ———? *Mus. Sowerb.*

Shell ovate, rather depressed, pale, whitish brown, with four rather broad brown bands; the margin thickened, produced, angular; beneath convex, light brown; above flat, extending greatly over the back, pale grayish with sandy mottled lines; base convex, shelving towards the edge, and the aperture white; aperture rather narrow; teeth small, white; columella plaited, front deeply

concave; spire quite concealed; inside white; axis $\frac{13}{16}$, diameter 1 inch.

20. *Cypræa sulcidentata*.

Testa ovato-oblonga, pallide castanea; carnea late quadrifasciata; lateribus incrassatis, luteo fusco arenosa; basi marginibusque albidobrunneis, subsulcatis; dentibus concoloribus profunde divis. *Inhabits* ———? Mus. Tankerville, Nost.

Shell ovate oblong, pale chesnut or grayish brown, with four broad flesh coloured bands, sides thickened, bright yellow brown, speckelled with pale whitish brown grains like sand, margin much thickened, angular, in front above slightly produced margined, pale brownish white; base convex same colour as the side, paler towards the mouth; aperture narrow, scarcely dilated in front; teeth close together, with very deep groves between them, extend over the shelving edges of the lips; columella front, deeply concave, deeply groved, plaited like the teeth; spire conical convex, covered; axis $\frac{17}{16}$, diameter $\frac{12}{16}$ of an inch.

This was first pointed out to me by my friend Mr. G. B. Sowerby; it only differs from *C. arenosa* by the front part of the margin, being produced, and the base being all of one colour, with the very deep groves between the teeth extending partly over the base, thus giving it somewhat the appearance of the base of *C. poraria*. It is a most distinct and very interesting species.

21. *Cypræa achatina*.

Testa ovalo-ovata, albida incarnata quadrifasciata; basi convexa; marginibus incrassatis sub-angulatis, cinereo lividis, supra castaneis fissurata, aperturâ dentibusque pallidis.

Cypræa Ventriculus. *Lamarck Ann. Mus.* xv, 452. *Hist.* vii. 381.

Cypræa achatina, *Solander's Mss. Portland Catalogue. Dillwyn R. S.* 446 !

Cypræa Carneola, *Martyn U. C. i. t.* 14. (*Dillwyn*.)

Coast of Otaheite, *Solander*; New Holland, *Lamarck*. Mus. Sowerby.

Shell ovate, pale whitish, with four flesh-coloured bands, the margin thickened, produced rather angular above, and beneath

convex, uppermost part chesnut brown, becoming gradually paler lurid brown, till it is nearly white at the aperture, generally cracked; base convex, shelving towards the edge and aperture; aperture rather broad; teeth large, pale, whitish brown; columella plaited, the front rather convex; spine perfectly hid; inside white; axis 2, diameter $\frac{14}{10}$ of an inch.

This shell is very similar to the preceding, which is easily distinguished from it by its smaller size, the more angular extended sandy upper part of the margin, the white base near the mouth, and the more concave front of the columella.

In these three species, perhaps the back which exhibits the outer bands should be considered as a very wide dorsal band forming a lanceolate spot; as I have not seen any other dorsal line, and the chesnut part of the true outer coat, and below that the thickened margin.

22. *Cypræa gibbosa*.

Testa ovalo-ovata, subventricosa alba; lateribus incrassatis rotundatis, posteriore sub-productâ, dentibus obtusis; columella antice profunde maxime excavatis sub-plicatis.

Fossil, from Bordeaux. Mus. Sowerb.

Shell oval ovate, rather ventricose, white; spire conical covered, sides thickened rounded, gibbous on the upper part of the back margin of the outer lip; base convex; aperture dilated and concave in front; the teeth distinct, blunt, nearly even; the front of the columella very deeply impressed, plaited, edge of the innermost part toothed; axis $\frac{18}{10}$, diameter $\frac{12}{10}$.

23. *Cypræa diluviana*.

Testa ovalo-ovata, ventricosa, alba; lateribus sub-incrassatis rotundatis; dentibus obtusis; columellâ lævi, antice sub-concavâ, excavatâ.

β. minor; axis $\frac{10}{10}$, diameter $\frac{7}{10}$.

Cypræa fabagina, Lamarck. *Ann. Mus.* xvi. 106. *Hist.* 406.

Fossil, from Bordeaux, Mus. Sowerb. *β. Mus. De France*.

Shell sub oval ovate, ventricose white; the spire conical covered, the sides rather thickened rounded, even, slightly produced and margined at the anterior extremity; base convex, aperture

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slightly dilated and concave in front ; teeth distinct, blunt, of the upper lip, very short ; columella smooth, with a large smooth impression in front ; axis $\frac{1}{10}$, diameter $\frac{1}{10}$.

24. *Cypræa Aurora.*

Testa orbiculato-ovata, turgida, sub-globosa, aurantia, sutura albedo fasciata ; basi lateribusque albis ; aperturâ aurantiâ ; dentibus rubris.

Cypræa Aurora. Soland Mss.! Portland Cat. 10. lot. 197 !
Chemnitz xi. 34! Lamarck Ann. Mus. xv. 452. Hist. vii. 382 !
Dillwyn R. S. 442 !

Cypræa Aurantium. Martyn, U. C. ii. 59. Gmelin, 3403 !
Schrieber's Conch. 115.

Icon. Favanne, t. 30, f. S ! Chemnitz xi. t. 18, f. 1737, 1738 !
Martyn ii. f. 59.

Inhab. Otaheite, Solander. Friendly Islands, Martyn. New Zealand, Chemnitz. Mus. Brit.

Shell orbicular ovate ventricose, nearly globular, of a beautiful clear orange or yelk yellow, with a white band round the suture, and end of the anterior extremity ; base rounded white ; side rather thickened white, rounded, except at the hinder extremity, where it is slightly produced ; aperture orange ; teeth red.

This shell is considered a very great rarity without a hole in the side ; this hole is formed by the natives of the Friendly Islands, where it constitutes one of the ornaments worn by their chiefs.

25. *Cypræa tessellata.*

Testa ovata, gibba, aurantiaca, ad latera tesseris albis fuscisque alternis tessellata ; basi albidâ, dentibus luteo fuscis.

Cypræa tessellata, Swainson Zool. Illus. ii.

Icon. Swainson. l. c. t. 111.

Inhab. New Zealand. Mus. Dom. Mawe, Goodall.

Shell ovate gibbous, orange yellow, extremities produced, margined at each side ; aperture narrow, teeth small, columella smoothish, anterior part concave ; axis $\frac{1}{10}$, diameter $\frac{8}{10}$ of an inch.

26. *Cypræa Vitellus.*

Testa oblongo-ovata, sub-turgida, fulva, obscure trifasciata,

guttulis punctisque niveis adspersa; basi albidâ; lateribus fuscis arenaceis substriatis.

Cypræa Vitellus. *Lin. Sys. Nat.* 1176. *Martini* j. 327. *Born. Mus.* 181. *Schroeter Einl.* t. 109. *Gmelin* 3407. *Schreiber's Conch.* j. 63. *Lamarck Ann. Mus.* xvi. 89. *Hist.* vii. 385. *Dillwyn R. S.* 448.

? *Cypræa subfuscula*. *Martyn n. c. t.* 96. (*Dillwyn*).

Icon. *Bonanni Rec. & Kirch.* iii. f. 254. *Lister Conch.* t. 693, f. 40! *Gualtier* t. 13, f. T. V. *Knorr.* vi. t. 20, f. 3. *Favanne* t. 30, f. I. 2. *Martini* j. t. 23, f. 228! *Ency. Method.* 354, f. 6!

1. *Junior*. Testa ovata fulva trifasciata.

2. *Incompleta*. Testa submarginata, guttata. *Lister Conch.* t. 675, f. 23!

3. *Decorticata*. Testa dorso purpurea, marginibus fuscis. *Martini* j. t. 23, f. 229.

Inhab. Indian Sea, Amboyna, *Rumphius*. Sunda, *Lister*. St. Omo, *Martini*. *Mus. Brit.* *Sowerb. Nost.*

Shell oblong ovate, rather ventricose, fulvous, with three obscure rather darker bands, scattered with large and small white spots; sides rather thickened rounded, brownish, rather streaked, and mottled with paler, giving it a sandy appearance; base whitish, or very pale brown, rounded; aperture rather broad, brownish white; teeth white, rather blunt; columella plaited, front rather concave; spire small, hid; inside purplish; axis 2, diameter $\frac{4}{10}$ of an inch.

It varies considerably in the darkness, but not in the distribution of the colour, and in size. The figure of *Lister* of the incomplete shell has been referred to for *C. guttata*, a very different and remarkably rare shell. The subfuscula of *Martyn*, from what *Dillwyn* observes, appears only to be a fine coloured specimen of this species, and I have not seen the figure.

27. *Cypræa Lynx*.

Testa ovalo-ovata, ventricosa, alba, guttis nigro-fuscis raris sparsis ornata, dorso inæqualiter cærulescente-punctata, lineâ dorsali flavescente; basi dentibusque albis, aperturâ croceâ.

Cypræa Lynx, *Lin. Sys. Nat.* 1176. *Martini*, j. 330. *Born. Mus.* 183. *Schreiber Einl.* j. 112. *Gmelin*, 3409. *Schreiber's*

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Conch. j. 64. *Lamarck. Ann. Mus.* xvi. 92. *Hist.* vii. 388.
Dillwyn R. S. 450.

Cypræa Chinensis, *Gmelin* 3421 (2).

Icon. Lister Conch. t. 683, f. 10! *Rumphius*, t. 38, f. N.
Pet. Amb. t. 16, f. 9. *Gualtier*, t. 13, f. 3. t. 14, f. B. *Knorr*,
vi. t. 23, f. 6. *Martini*, t. 23, f. 230, 231! *Born.* t. 18, f. 8.
Ency. method, t. 358, f. 8. *Argenville*, t. 18, f. 3. (2).

1. *Junior*. Testa ovata.

2. *Incompleta*. Testa oblongo-ovata, sub-trifasciata inæqualiter
fulvo maculata, aperturâ aurantiâ.

Cypræa Vanelli, *Lin. Sys. Nat.* 1175. (4). *Gmelin*, 340.
Dillwyn R. S. 443.

Cypræa squalina. *Gmelin*, 3420. (3). *Schreiber. Conch.* i. 79.

Cypræa Vanelli, *Turt. Syst. Nat.* 332.

Cypræa n. 3. *Schroet Einl.* i. 134.

Lister Conch. t. 884, f. 31. (3). *Petiver's Gaz.* t. 95, f. 13. (4).
Gualtier, t. 16, f. R. *Knorr*, iv. t. 9, f. 6. *Martini*, i. t. 2,
f. 250, 251?

3. *Decorticata*. Testa obscure trifasciata, fulvo fuscoque maculata.

Inhab. Indian Ocean, Sunda, Mauritius, and Ascension Island,
Lister. Madagascar, *Linneus*. Barbadoes. *Petiver*. Isle of
France, *Lamarck. Mus. Brit.* Söwerb. Nost.

Shell ovate, ventricose, white, ornamented with a few scattered
blackish-brown spots, especially on the sides; back clouded with
unequal bluish spots; dorsal line yellowish; sides thickened,
rounded; base white, narrow, with a keel-like ridge on each
side shelving towards the aperture; aperture scarcely larger in
front, orange red; teeth distinct, blunt, white; columella plaited,
front rather concave.

Obs. This shell, on account of the various appearances which
it assumes before it arrives at perfection, would be difficult to
distinguish, were it not for its orange mouth and white teeth.

When young the shell is pale yellow with three double bands: it
becomes whiter, and ornamented with various sized fulvous spots;
after which is deposited a white coat, which is spotted with
brown, making the fulvous spot appear bluish through it.

[To be continued.]

ART. XX. *An Inquiry respecting the true nature of Instinct, and of the Mental Distinction between Brute Animals and Man.—Essay II.—An Examination of the prevailing division of the Brute Powers into Intellectual and Instinctive, as presented, in some recent publications, by the Rev. Dr. Fleming, and by M. Frederic Cuvier; including strictures on the Theory of Habit proposed by the latter: with Illustrations of the Specific Constitution of the Brute Mind.* By JOHN OLIVER FRENCH, Esq.

IN prosecution of the views submitted in my preliminary observations on the nature of the Brute Mind,* in which I have attempted to assign a definite limit to its capabilities, I now propose to exemplify the necessity of such limitation, by pointing out the inconsistencies inseparable from those systems which rest upon the proposition, That the actions of Brutes, in certain cases, result from a principle of proper Intelligence; and, in others, from an undefined principle;—the essence of which the advocates for those systems do not seek to explain, considering it however to be something distinct from Intelligence:—to take an incidental view of the chief principle of action as it exists in Man, the phænomena of whose mind must form the standard of comparison in all investigations of this kind:—and to draw some affirmative conclusions respecting the essential nature of Instinct.

In the actions of some animals, particularly of those who are formed to be the more immediate associates of Man, there are, it must be admitted, strong appearances in favour of the opinion, that they do indeed possess faculties the same in kind with, and differing only in degree from, those of Man: and I am free to acknowledge, that, at first sight, and were I to consider those appearances in an isolated manner, such would be my conviction. But upon a careful examination of the general constitution of the Animal Mind, and of its economy in the aggregate, it will, I think, be discovered, that all conclusions drawn from those ap-

* See *Zoological Journal*, No. I, p. 1. et seq.

pearances alone, in favour of this opinion, prove too much; and consequently leave much to unsay: and that if examined under their essential relations to that economy, they merely evince the existence of a conscious nature in the lower animals, related to the intelligent consciousness of Man, by *analogy*;—but not by *affinity*.*

* It has been suggested to me that the rule in Natural History, which Mr. W. S. Macleay has developed with so much ability and success, “*that Relations of Analogy must be carefully distinguished from Relations of Affinity*,” may be equally applicable to the subject before us. I can at present only offer a few remarks in support of this idea, of which however I have to a certain extent availed myself in the present Essay; and which appears to afford a corollary to the theory of instinct now proposed: but I hope on a future occasion, to render its validity apparent. Mr. Macleay, when explaining the theoretical difference between affinity and analogy, concludes with the following observation: “As a relation of analogy must always depend on some marked property or peculiarity of structure, and as that of affinity, which connects two [or more] groups, becomes weaker and less visible as these groups are more general, it is not in the least surprising, that what is only an analogical correspondence in one or two important particulars, should often have been mistaken for a general affinity.” Now those philosophers, who, whilst comparing the attributes of the lower animals collectively, with those of Man, have readily admitted the absolutely inferiority of the former, have yet, whilst considering the mental relation to Man of particular species or groups, mistaken the ‘analogical correspondence,’ which the various forms of Instinct bear to the rationality of Man, for a ‘general affinity’ between Man and the Brute Creation:—for the result of their principles would be to shew that there exists a gradual transition, ‘a simple chain of affinities,’ from rationality to blind instinct. M. Frederic Cuvier, whilst considering the Brute Creation in the aggregate, perceives that the minds of brutes can have no relation of affinity to the human mind; he therefore denies to them the power of reflection: but observing two species of action in brutes, the one apparently free, the other apparently mechanical, he mistakes the relation of analogy which these bear to the actions of Intelligence and Habit in Man, for one of affinity, and virtually ascribes a relation of that kind to what he terms mechanical instinct, and habit; and also to human, and what he denominates brute intelligence. Thus after denying reflection to brutes, he concedes to them the very principle from which reflection flows. It seems equally true of the world of mind as of that of organized matter, that though affinities are continuous, yet, as Mr. Macleay observes, while discussing the notion of Bonnet as to the law of continuity, ‘the series of natural beings is not simple.’ See *Horræ Entomologicæ*, p. 362—364. *Linn. Trans.* vol. xiv. p. 48—52, &c. *Dict. des Sciences Naturelles*, tom. xxiii. p. 528, et seq. *Mem. du Mus. d’Hist. Nat.* tom. x. p. 241, et seq.

The two-fold division which has been made of the conscious faculties of animals, into *Intellectual Powers*, including intelligence; and *Active or Instinctive Powers*, which are supposed to be destitute of intelligence; is, I conceive, when viewed in its results, far from being satisfactory or conclusive. It appears that similar powers, which, on the one hand, when they are specifically treated of, are said to be exercised in freedom, *and not necessarily*; are yet, on the other, when the effects of the unknown principle of instinct are discussed, comprehended in it, considered as being exercised *necessarily*, and thus enlisted into the service, and placed in the ranks, of the Instinctive Powers: so that the Intellectual Powers are marshalled under the orders of Instinct, and the Instinctive Powers under those of Intellect, reciprocally, as the exigencies of the service may require. As it is highly necessary therefore, that the subject should be divested, if possible, of a perplexity, which if unremoved would baffle every attempt towards elucidation, I trust I shall be excused for the freedom of the remarks I am about to offer upon the Chapter on the 'Faculties of the Mind,' which forms a part of Dr. Fleming's 'Philosophy of Zoology.' With respect to the conscious capabilities of the Brute Mind, it is plainly inconsistent, to bring the principle of proper intelligence into requisition, in order to explain the accomplishment of instinctive acts: for if this be done, the lower we descend in the scale of creation, the more perfect should be the intellect ascribed to the creature; and the palm of intelligence should be awarded to the Insect world.

That Man has no connate knowledge is a maxim of true philosophy and of experience. It does not even appear capable of proof, that the infant applies from any connate knowledge to its mother's breast, but is taught by applications on the part of the mother or the nurse: it knows not how to walk, to articulate, nor even to express the affections of love; it will catch at any thing, however hurtful, that it can lay its hands upon, and apply it to its mouth. The reverse of all this is displayed in the Brute; as is well known. Surely then Divine Wisdom must necessarily have contrived and ordained these things, for the purpose of effecting a total separation of the Human from the Brute nature;—to the end

that man might be Man, and that brute might be brute : thus man's imperfection at his nativity is his perfection, while the perfection of brutes at their nativity is their imperfection. For man is born absolutely without the knowledge of any thing, in order that he may be capable of receiving the knowledge of all things ; and may freely appropriate it, by means of his proper faculty of intelligence. Were knowledge infused into him at birth, as is the case with brutes, it would no longer be knowledge, but mere perception ; though the most surprisingly intelligent effects might result from it, as we behold exemplified in brute instinct. As the love of truth is peculiar to man ; so also is knowledge.

The ground of these facts, so comprehensive in its nature, and involving a final cause so important, so dignified, so sublime, as the Immortality of Man, is rendered inexplicable, if we admit that brutes possess a nature formed upon a similar plan : which admission we are however compelled by facts to make ; unless we subscribe to the doctrine, that a contingent or varying principle of instinct, furnishes perception in the minds of brutes, for specific ends,—and more particular in those among them whose natures adapt them to be influenced by Man ;—similar to that which is observed to actuate them in a more uniform manner, when placed without the sphere of his influence.

Dr. Fleming observes, under the head of Intellectual Powers, “ that the lower animals possess some notion of power and of cause and effect, may be inferred from various actions which they perform ;”—and he then adduces, in proof of this assertion, the process employed by the *Corvus Cornix* or Hooded Crow, for breaking the shell of the Buckie (*Buccinum undatum*). “ Seizing the shell with its claws, it mounts up into the air, and then loosing its hold, causes the shell to fall among stones, (in preference to the sand, the water, or the soil on the ground,) that it may be broken and give easier access to the contained animal. Should the first attempt fail, a second or a third are tried, with this difference, that the crow rises higher in the air in order to increase the power of the fall, and more effectually remove the barrier to the contained morsel.”*

* Philosophy of Zoology, Vol. i. p. 231.

These performances of the Crow are thus deduced from a supposed knowledge of power and of cause and effect proper to the creature, thus from rational intelligence as a ground ; such knowledge being inferred as necessary to the production of the actions in question. It is true that the author, aware of the delicacy of the inference, arrives at it by rather a guarded process ;—" Were we," he observes, " merely inactive spectators of the changes which take place in the world, it is probable that the ideas of reflection which would result from the contemplation of these, would be limited to resemblance and succession. But as we begin to act upon the objects around us, and produce in them various changes, we *acquire a knowledge of our own power*. When we see changes produced independent of us, we consider it as the display of some other power. These changes, and the efforts which have preceded them, excite our ideas of cause and effect, means and ends."

" That the lower animals, &c." he proceeds to observe, as above quoted ; and he then illustrates the position by the case recited. But it is surely too much to say, that because these actions involve in them such a thing as the knowledge of power and of cause and effect, such knowledge is to be attributed to the Crow. It certainly comes more within the limits of the case to say, that they are the results of simple perception in the creature,—that an *instinctive intuitive perception*, independent of any effort of intelligence on its part, of the fit and proper means of possessing itself of its prey, accompanies the *instinctive desire* to obtain it : thus that the wonderful discriminations alluded to are not derived from any rational deduction, resulting from the unassisted faculties of the Crow ;—but are primarily induced by a superior influence. Appetites, desires, and affections, have been stated to include the whole of what constitutes the Instinctive Powers,* but that such is not the case admits of satisfactory demonstration. It may be shewn that there must be an essential intelligence, which, however complicated in its origin, as involving the knowledge of power, cause, and effect, must develop itself in the conscious mind of the animal in the form of *simple*,

* See Philosophy of Zoology, vol. i. p. 243.

intuitive or *instinctive perception*, which perception, superadded to the *instinctive desire*, must constitute the instrumental means of accomplishing it. Thus the Crow, (a fact, by the way, which Dr. Fleming appears to have overlooked,) must have a perception of there being an animal within the shell proper to become its food, which perception it never could have derived from any analysis of its own; and which must therefore belong to it as an influent or communicated knowledge, of the nature of which it is unconscious. Instinctive Desires are most distinct from those perceptions which are necessary to their fulfilment. If these principles were not distinguishable, the instinctive appetite for food, in the Human being, would infallibly be accompanied, as it is in the lower animals, with the perception of the means of obtaining and masticating it. So the instinctive desire of warmth does not give the Monkey a knowledge of the means of perpetuating fire. "The Monkey may approach the fire which the Savages have left, and warm himself at its glowing embers, but he is never prompted to secure a continuance of the comfort, by the addition of fresh fuel, or by setting fire to combustible matter in another situation."* Neither, it might be added, does the instinctive desire of warmth, or that of protection from the inclemencies of weather, help the Monkey to any perception of the means of making himself a coat; although, prompted by its peculiar desire, the insignificant Tinea or Clothes' Moth, acts the tailor with surprising dexterity, not only in making, but in mending and altering likewise. The instance of the Monkey and the fire shows that no proper intelligence is concerned in the perceptions of this animal; for how, upon such a supposition, could we conclude that so sagacious a creature would fail to exercise it in subservience to so potent a desire as that of warmth:—it would be quite an anomaly in the character of the animal. The Hooded Crow also, I infer, and shall proceed more fully to show, does not, in its discriminations, act from conscious intelligence, any more than the Monkey; but both from instinctive limited perception; which, however it may be modified according to cir-

* Philosophy of Zoology, vol. i. p. 253.

cumstances, as we frequently observe it to be, has no relation of affinity to human intelligence.

Dr. Fleming, when treating of 'Instinctive Desires,' describes the economy of the *Phryganææ* or Caddis-worms, which pass the first portion of their existence in the water, and clothe themselves with bits of straw, sand, or shells, which they cut into shape, and form into a tube a little larger than the body, in which they dwell, and which they likewise carry about with them. The parallelism between this case and that of the *Corvus Cornix* will immediately be seen. "These animals," continues Dr. Fleming, "do not, in obedience to this instinct, employ the materials within their reach indiscriminately; for the covering might, in that case, become too heavy to be easily carried about with them at the bottom of the pool,—or too light, and, by rising buoyant to the surface, remove them from their sources of nourishment. They select and arrange the materials, so as to avoid both these evils." Judging from appearances merely, this case is surely a more illustrious one than that of the *Corvus Cornix*, which, as we have seen, is instanced by Dr. Fleming, when treating of the Intellectual Powers, to prove that the knowledge of power, and of cause and effect, is an attribute of the animal mind; for upon the author's own principles we may prove that similar knowledge is no less attributable to the philosophic *Phryganææ*, who might with equal propriety have afforded an illustration of Intellectual Powers, instead of being confined to the humbler region of Instinct, in the author's arrangement.

It is true that Dr. Fleming, in some degree, qualifies the assumption that attributes of this kind belong to animals, by his mode of expressing it, when he says, "That the lower animals possess *some notion* of power and of cause and effect, may be inferred from various actions which they perform." But if those actions be at all the results of an intelligence similar in kind to that of man, they prove something more on the part of animals, than is expressed by the term "*some notion of power, &c.*;" which indeed is clearly to be inferred from the philosophical definition of the gradual development and formation of the attributes in question, which immediately precedes this Naturalist's

ascription of them to the *Corvus Cornix*; when considered connectively with the actual operations of the creature. The combination of such attributes and operations would be amply sufficient to raise the Crow far above the level of uncivilized Man.

I have been at some pains to understand the nature of the views laid down by the author, and would not willingly or negligently misrepresent them; but when I read, under the Section 'Ideas of Reflection,' the knowledge of power explained to consist in an appreciation of cause and effect; and when I find this knowledge, in kind at least, made applicable to the case of animals, and illustrated by instances of instinctive economy; and when I again read, under the head of 'Instinctive Powers,' that "the lower animals *have their curiosity confined to effects*;" and that "*man alone investigates causes*,"* I am forced to conclude that Intellect and Instinct are confounded.

Dr. Fleming, when treating of the instinct which causes animals to form habitations, says, "In the arrangement of the entry, *this instinct displays its extraordinary powers*. Sometimes the entrance, as in the case of the Otter and Pole-cat, opens into a thicket, or under the cover of a hanging bank. In other cases, as that of a spider, termed by LATREILLE *Mygale cæmentaria*, the entrance is closed by a door formed of particles of earth cemented by silken fibres, and closely resembling the surrounding ground. This door, or rather valve, is united by a silken hinge to the entrance, at its upper side, and so balanced, that when pushed up, it shuts again with its own weight."† In this instance, which occurs under the head of 'Instinctive Powers,' an intuitive perception, quite distinct from proper intelligence, is evidently implied, and indeed included in the assertion, "*this instinct displays its extraordinary powers*." Not a word is here said about the design or invention of the architect; on the contrary, this is considered by the author as an instance of pure non-rational instinct: whereas we find, that because "the Ermine will conceal a number of eggs in a particular place, and return at intervals to its magazine," and a Fox or a Dog possessed of

* Phil. of Zool. vol. i. p. 258.

† Ibid p. 255.

more food than is necessary for the supply of present wants, conceals the remainder until again urged by the calls of hunger ;” these animals are said to possess a knowledge of *time* grounded in ideas of reflection.* The last mentioned cases, prove merely the existence of instinctive propensity and perception ; and are as little adapted to support the doctrine of the animals’ possessing abstract ideas, such as those of time and space, as the history of the *Mygale camentaria*. All are illustrations of Instinct, not of Intelligence.

I might quote other examples to shew that the author in some places practically attributes the means of accomplishing the ends of Instinct, to an Intelligence the same in kind with that of human reason ; while in others he includes those means under the idea of an Instinctive power, which, properly considered, totally excludes the operation of such Intelligence. Indeed the error of the system appears to consist ; first, In the mental faculties of the Brute being identified with those of Man, on account of the analogical appearances in their actions ; and in making the faculties thus defined the effective means for the accomplishment of instinctive desires, which is in reality done by the author in his consideration of the ‘ Intellectual Powers :’† and secondly, In making the instinctive desires to include the operation of the same faculties as are treated of under the head of ‘ Intellectual Powers.’‡ By the latter view we are called upon to deny the distinct exercise of such ‘ Intellectual Powers,’ which would be fatal to the theory ; and by the former we are necessitated to ascribe them even to Insects.||

* See Phil. of Zool. vol. i. p. 230. † Ib. 215. ‡ Ib. 241.

|| Apparently aware of the difficulty with which the subject was beset, Dr. Fleming remarks, (p. 312) “ The impressions made upon the senses by external objects, excite the movement of the intellectual powers, and they operate equally on our instincts. The instinctive powers may be said to comprehend the relation of our impressions almost intuitively. The will can excite the senses to action, and the instincts can do the same. It is impossible, therefore, in treating of the origin of the motions of animals, to separate the volition of intellect from instinct, because few actions can be excited or continued by the latter, without being perceived by the former. It was in consequence of this intimate connection, that we treated of the instinct of animals, along with the

In order to clear the way for a due appreciation of the views I purpose to develope in the sequel, I must now proceed to examine the different, and very ingenious hypothesis of M. Frederic Cuvier, as laid down by him in the article 'Instinct,' in the 'Dictionnaire des Sciences Naturelles;' and in connection therewith, his examination of Mr. Dugald Stewart's opinions on the nature of habit, which has appeared in a late number of the 'Mémoires du Muséum.'

This skilful naturalist endeavours to fix a distinction between Intelligence and Instinct, by means of the character of *variability* applied to the former, and that of *invariability* applied to the latter; without entering into any examination of the essential nature of Instinct, of which he observes in a note, p. 529 of the Dict. des Sciences Nat. "nous ne sommes point encore censés con-

functions of mind [or Intellectual Powers] which depend on the nervous system. *We by no means, however, give it as our opinion, that Instinct and Intelligence are the same, either in kind or in degree.*" How this latter observation can be made to tally with a preceding one (p. 242), I am at a loss to conceive. "Much confusion," says the author, "has arisen by the vague use of the terms Instinct and Reason, and much vain speculation has been indulged, in consequence of no distinct and definite ideas being attached to them. *No confusion*, however, could arise, were we to consider *reason* as expressing the movements of our Intellectual powers,—and *instinct* those which have hitherto been termed Active." Nor is it easy to see how this theoretical distinction is preserved when cases of pure instinct are adduced as proofs of intelligence under the head of Intellectual Powers, in the manner pursued by the author, in which such principles are attributed to the creature under the same sense and meaning as he attributes them to Man. (See definition of Imagination, p. 221—225, &c.) It surely does not meet the difficulty, nor is it consistent, in distinguishing between Intellect and Instinct, to make the former a passive spectator, by saying that "few actions can be excited or continued by the latter without being *perceived* by the former," when at the same time, the Intellect is made, by the author's method of considering the subject, not merely to *perceive*, but to be the *active instrument* in accomplishing the appetites, desires and affections, of Instinct. A conscious intelligence, such as that illustrated by the author, including ideas of reflection, synthesis, and analysis, is either the means by which Instinctive Desires act, or it is not.

Should the above remarks meet Dr. Fleming's eye, he will I am sure receive them with that candour which distinguishes the lover of truth; and as I have no other view in offering them than that the truth may prevail, he will not impute to me any wish of depreciating his useful labours in Zoological science.

noître les élémens.” At page 532, he thus defines instinctive actions; “Le caractère des actions instinctives sera d’être fixes et de se reproduire constamment les mêmes dans toutes les situations;” but in p. 534 and 535 we find him obliged to take refuge under a series of exceptions, to the list of which many more might be added, even from the Insect world;—exceptions which, upon a candid view of the case, must be considered fatal to his hypothesis, ingenious as it is, and founded upon actual appearances.

“Le caractère de variabilité,” he says, “qui est donné aux actions contingentes, et celui d’invariabilité qui est attribué aux actions nécessaires, ne doivent cependant pas être pris dans un sens tout-à-fait absolu. L’animal conserve toujours l’exercice, de ses sens et le degré d’intelligence qui lui est propre, et il les emploie l’un et l’autre de la manière la plus favorable à l’action nécessaire à laquelle il est porté. L’exercice de ces facultés est même toujours proportionné au degré de nécessité des actions; plus le besoin, le sentiment qui entraînent l’animal à agir, sont impérieux, plus aussi ses facultés sont captives: c’est pourquoi l’instinct nous paroît beaucoup plus fort chez les uns que chez les autres. Il n’y a aucune comparaison à faire à cet égard entre le hamster qui se forme des magasins pour l’hiver, et le chien qui cache sa nourriture surabondante: rien ne peut détourner le premier de son action, et, au contraire, la moindre circonstance peut distraire le second de la sienne. Mais il y a plus: de nombreuses observations font penser qu’une longue habitude transforme en quelque sorte les actions contingentes en actions nécessaires, et que celles-ci ne sont pas soustraites sans réserve à une action longtemps continuée des circonstances extérieures et accidentelles, et qu’elles prennent quelque chose des actions électives. Plusieurs animaux, en effet, nous en donnent la preuve: les chiens de chasse proprement dits n’ont besoin d’aucune éducation pour se livrer à cet exercice et poursuivre les bêtes fauves, tandis que les barbets, les dogues, par exemple, n’y sont point naturellement portés. D’un autre côté, on assure que les lapins, tenus pendant plusieurs générations dans des lieux où ils ne peuvent fouir, donnent naissance à des races qui ne sont plus portées à se creuser des terriers; et Leroi dit positivement que les jeunes renards qui se trouvent

près des lieux habités, montrent par leurs actions, même avant d'avoir quitté le nid, beaucoup plus de prudence et de ruse que ceux qui vivent dans les contrées sauvages où ils ont peu d'ennemis à craindre et à fuir. C'est qu'il n'est pas plus ici qu'ailleurs de lois absolues. La nature est un ensemble harmonieux dont toutes les parties sont liées, où toutes les transitions sont adoucies, et qui présente avec d'autant plus de force ce caractère d'unité qu'elle a dû recevoir de son auteur, que l'intelligence qui la contemple a su se placer dans un point plus élevé et embrasser une plus grande étendue de phénomènes; mais cet ordre suppose des rapports différens, permet des rapprochemens et des distinctions, et ce sont eux que nous avons dû d'abord chercher à faire connoître."

The author here certainly draws too largely on the harmony of nature, to sustain that of his ingenious theory. If the Fox, in the instance alluded to, discovers more prudence and cunning near inhabited districts than in savage ones, and this even before it quits the asylum of its den, this peculiarity must arise either from its intelligence, or from a variation of instinct: but it cannot owe it to intelligence, for, as observed by M. Cuvier, p. 530, "Il n'y a jamais eu de contestation fondée sur les actions antérieures à toute expérience: simples ou complexes, elles ont toujours été considérées par les naturalistes comme instinctives; et, en effet, il faut bien qu'une force aveugle et nécessaire les ait fait naître, puisqu'aucune expérience n'avoit encore pu mettre en jeu les facultés de l'être qui les manifestoit." Here then is a dilemma in essentials:—the character of instinct must vary, and thus produce variable or contingent actions, in appearance exactly similar to those produced by intelligence; in which case the definition above quoted, "le caractère des actions instinctives sera d'être fixes, est de se reproduire constamment les mêmes dans toutes les situations" falls to the ground: or, if this be denied, the actions of animals anterior to experience must be taken to result from intelligence, in which case intelligence usurps the functions of instinct, and we are forced to give a negative to the proposition, "Il n'y a jamais eu de contestation fondée sur les actions antérieures à toute expérience," &c. &c. If in this instance of the Fox, intelligence be taken in any degree into the account, we must also

reverse M. Cuvier's position, "Plus le besoin, le sentiment qui entraînent l'animal à agir, sont impérieux, plus aussi ses facultés sont captives," and say the more imperious the necessity, the feeling, which leads the animal to act, the more his faculties are free and unrestrained; or in other words, the greater is the measure of Intelligence—not of Instinct!

It is, I think, plain from this statement, that it is impossible to overcome this difficulty by reasoning upon appearances, or by deductions from effects merely; otherwise M. Cuvier would certainly have succeeded in establishing a theory to which appearances give so strong a support, and which is developed with his accustomed talent. He seems nevertheless fully aware that the essential causes of action, and their modifications, must be looked at as principles, before any certain conclusions respecting the point of mental separation between Man and Brute can be arrived at. In p. 534, he sensibly observes, "C'est que ce ne sont point les actions qui paroissent naître de combinaisons profondes, de calculs compliqués, de vues ingénieuses qui distinguent véritablement l'homme des autres êtres intelligens; nous trouvons, comme nous venons de le voir, des preuves de l'existence de ces actions chez les animaux les plus imparfaits, et à un degré que nous ne pouvons peut-être pas dépasser de beaucoup: *c'est la liberté seule, la faculté de connoître, qui fait la véritable supériorité de l'intelligence humaine.*"

This Liberty, and this Faculty of Knowing, are manifestly the distinguishing attributes of Man: but if Brutes, *in any degree*, act from proper intelligence of their own, it is impossible to deny them this liberty—this faculty of knowing; and if granted in any degree, the very nature of the faculty is such as to be capable of indefinite extension. No man has ever yet assigned to it a limit; nor, I am persuaded, ever will. The faculty is indeed essentially incapable of limitation in the human mind; and as far as we can determine, it must be so absolutely. This fact will however receive illustration of a practical nature as we proceed.

If the principle of free intelligence at all belonged to the Brute, if unassisted, as in the case of Man, he could determine by means of this principle upon a contingent act, he would be able to con-

template his non-contingent acts also; and not his own merely, but those of other animals, and of Man, and indeed all the phænomena around him; it is impossible to limit the operation of a principle *essentially* free: it therefore follows, that Intelligence, though present in Instinct, exists in it in a form differing from the reason of Man: Instinct is a type of Reason, allied to it by analogy, but not by affinity, as before observed.

It is to the difference of the conscious reception of the principle of Mind, which, there is every reason to believe, is in its origin one with that of Life, that the different created Beings owe their true distinction. Man alone appears gifted with the conscious reception of this principle *in freedom*; to this he owes his consciousness of knowledge; it is this distinguishing and glorious faculty of liberty which separates him from the Brute; it is this which capacitates him for, and is the true ground of, his immortality! To the want of this the Brute owes that measure of happiness, which results from his not being able to contemplate the nature of happiness or of misery;—it is the want of this that deprives his sufferings of their sting. Finally, it is this which draws that impassable barrier between the most barbarous Savage and the most sagacious Brute, which no human ingenuity will ever be able to explain away.

We are now arrived at the point at which it becomes necessary, towards the further development of our subject, to take into consideration the nature of Principles of Action; so far as the consideration of them affects its elucidation.

Looking at principles of action as they exist with respect to our own consciousness, they appear to exhibit themselves under two distinct forms; the first of which may be called Reasoning Intelligence,—as giving birth to those actions, which we are conscious of, from their being the result of a mensurate reflection and deduction; the second, Immediate, or Intuitive Intelligence,—as giving birth to those actions, which, as to our consciousness, do not appear to be the result of a mensurate reflection, or of any reasoning deduction. Of this latter character are the actions of habit, which might indeed be termed *human instincts*; being distinguished from *brute instincts* by the circumstance, that they are generated by the conscious intelligent principle.

This is a most important provision in the organization of the human mind ;—a distinction which shows the wise and beneficent care of the Creator, in preserving the essential freedom which is the characteristic attribute of that mind, and which draws the line of demarcation between Man and Brute ; while it at the same time provides a modified principle in the nature of the former, equivalent, for the purposes of utility, to the instinct of the Brute. Man is led to labour for the acquisition of relative ideas, which are used as instrumental mediums for the performance of actions, subsequently to be executed by him, without the conscious intervention of any ideas whatever.

This is exemplified in what have been termed habits of art, as in playing on musical instruments, &c. We have the most beautiful as well as conclusive proofs of it, in the opening energies of the infant mind. The child takes the fluid in its spoon and turns it upside down whilst lifting it to its mouth : by degrees, however, and by means of the gradual exercise of its reflection, it discovers and learns to correct the error : it exercises its unfolding intellect in acquiring the requisite ideas, which it uses to perform this and similar acts ; still however accomplished by an effort requiring considerable caution and attention ; until it can at last teach another child younger than itself to do the same ; for its reflection has laid hold of it and made it a subject of knowledge : but as it grows up the reflection that it bestows on such acts as these is gradually lessened, until they are at last performed, without the intervention of ideas of reflection, and as it were spontaneously ; so that it appears as if the reflective principle or intelligent volition had receded, and left some other principle of action to fulfil its deserted functions.

But surely we ought to regard this not as an annihilation, but as a modification of the cause, as it affects our consciousness. There is such a thing as the concentration of natural power, whereby the most wonderful operations are wrought instantaneously, which would otherwise require a tedious and elaborate process for their accomplishment ; and if there be in this respect any analogy between natural and mental power, we may expect similar phænomena to be effected by the latter ; and there is an important final cause

why principles of intelligence thus modified, however variously their movements may be perceived in our consciousness, should acquire the nature of active powers, as to their modes of operation.

M. F. Cuvier however, considers actions of habit as purely mechanical ; after enumerating several, and exemplifying the progress of their acquirement, he observes of them when perfected ;— “ dès-lors tous ces principes raisonnés par lesquels nous avons vu commencer l'exemple que nous venons de détailler, sont *transformés* en de simples associations de mouvemens, en un pur mécanisme. Presque toutes nos actions peuvent prendre ce caractère ;” and in another place he says, “ Et tout ne semble-t-il pas être organique dans l'exercice de la lecture, dans celui des armes, dans le mouvement des doigts sur un instrument de musique ? Nous reconnoissons les caractères et articulons les sons qu'ils représentent, quoique notre esprit soit entièrement préoccupé par le sens de ce que nous lisons : le maître d'armes suit de son fleuret le fleuret de son adversaire, sans qu'aucune pensée vienne contribuer à ses rapides mouvemens : le pianiste parcourt des deux mains son clavier dans tous les sens et suivant toutes les combinaisons que les dix doigts peuvent former, malgré l'attention exclusive qu'il donne aux notes placées sous ses yeux et qu'il fait rendre à son instrument. Tous ces exercices, comme toutes les pratiques de l'industrie, sont même d'autant plus parfaits que la pensée leur est devenue plus étrangère ; tant qu'elle leur est encore nécessaire, on les possède mal, et en ce point c'est véritablement en se rapprochant des animaux qu'on se perfectionne. Il n'y a rien d'absolument différent dans ce que produit l'instinct, et la comparaison du tisserand et de l'araignée est bien plus exacte et plus juste qu'on ne l'a pu penser. Ces deux ordres de phénomènes pourroient même tellement se confondre, qu'on feroit en quelque sorte de l'instinct avec de l'habitude, si ce n'est de l'habitude avec de l'instinct : une personne qui seroit exercée, dès son enfance, à ramasser et à cacher tout ce qui lui reste de ses repas, finiroit par le faire aussi machinalement et aussi inutilement que le chien domestique.”*

* Dict. des Sciences Nat. tom xxiii. p. 543.

It is indeed true that the principle of Intelligence does in its progress assume the form of an Active Principle; because final causes require such a modification: but are we hence to conclude that it changes its essence likewise?—and that human action, in proportion as it becomes more perfect, is really assimilated more to that of brutes? It is true that the author, in the note p. 540,* saves himself, in some measure, by quitting hold of essentials; but this, I contend, is not meeting the question: for essentials are fairly involved in the consideration of the subject, and cannot without confusion be separated from it. It is true, that in playing on a musical instrument the mind operates in different modes *at the same time*, the one subordinate to the other; but *the mind operates* nevertheless in them all in a *rational and proper manner*: the various actions are therefore the results of the intelligent principle: though the final cause requires that our conscious attention should be principally directed, elevated, as it were, to the sense and sentiment.

It is surely more consistent to admit the doctrine of Mr. Dugald Stewart, to which this of M. Cuvier is opposed—and to agree with him, that if we can explain the actions of habit by the laws which regulate the human mind, the principles of sound philosophy require that we should not look for other causes. Besides, how, it may be asked, does the Intelligent Principle separate itself from the unknown (as to its essence) Mechanical Principle?—and at what point is the complete separation effected? No consistent answers, I apprehend, can be made to these questions.

Does not M. Cuvier, in this case, mistake the concentration of intelligence itself, or some particular modification of it, for its total absence? Is there no intelligence in the Mathematician's immediate recognition of a particular formula?—his quick and decisive scientific combinations?—and is not the immediate perception of relation, as the result of an intelligent power, equally obvious

* “ Je n'ai pas besoin de faire remarquer que je n'envisage ici que la succession naturelle des faits, et que je ne m'occupe ni de leur cause ni du principe général de l'activité.”

in the acts of a Fencer or of a player on the Piano-forte, as in those of the Mathematician? the slightness of our attention to the minute acts we perform, is surely no proof that such acts are not effected by an intelligent power.

There is indeed, in the intelligence of the highly-disciplined mind, an habitual endeavour or action against the inroads of what in the man who possesses it, is most analagous to Instinct, namely, his corporeal appetite; restraining and guiding it, and keeping it in due subordination: and this from impressions of truth not directly referred to in the conscious operations of the mind, at the moment in which such habitual action takes place, but operating as it were, tacitly and instantaneously. Yet who will say that such habitual action is not caused by an active and powerful intelligence. The powers of intelligence in Man appear indeed to be capable of operating in different modes, all of which are essentially rational in themselves.

Human intelligence is formed by the *Faculty* of Intelligence implanted within, digesting truth as it is received from without; but this intelligence may be, and is, successively modified as an *active power*; as much so as any of those other powers to which this term has, as I conceive, been improperly limited: the most sublime efforts of reasoning form but the *ordinary principles* of minds disciplined in truth and virtue. For it is evident, that all the modes of operation of intelligence itself, cannot be included in the tardy processes of analysis and synthesis. Those processes are but modifications of the faculty of intelligence. Immediate action is equally predicable of intelligence: our inability to trace a reflective process in certain actions, is therefore no proof that such actions are not the results of intelligence; if this were not the case, and if a cogitative process were the only test of the workings of intelligence, many actions, not habitual, might be argued to be as non-intellectual as those of habit:—actions in which, nevertheless Intelligence is most conspicuous, being the results of what is on this very account emphatically styled *Presence of Mind*. In that instantaneous operation of the mind, in which action follows like the lightning's flash, without any percep-

tible steps of comparison passing through the consciousness, we yet cannot, with any truth, deny Intelligence to be the moving cause of such act; merely because it is not seen, as when directing movements on a chess board. Besides, after performing them, we can reflect upon them, and discover, by reflection, that is, by analysing the intelligence of the act, the degree of Intelligence involved in it. When we reflect on the actions which Presence of Mind has produced, they sometimes present themselves to our consciousness accompanied with an emotion of surprise, almost as if they had been in a manner the results of accident, and not of Intelligence; while yet we feel assured of the contrary, since the act has been rational. A lower measure of this same feeling no doubt accompanies the performance of any very skilful operation; for instance, in music. The operator seems to himself, as it were, possessed of a sort of magical power of execution; and this very feeling could not exist, were he not at the same time conscious that it was the result of the Faculty of Intelligence exerted in a peculiar mode; for it is the sense of the presence of this intelligence in action that conveys the sentiment. In the illustration of the operation of Intelligence, by tracing a conscious analysis in the mind, at the time of performing such actions, M. Cuvier thinks our countryman Mr. Dugald Stewart has failed. This failure, however, is not material to the question at issue; nor is it possible to illustrate in detail the *modus operandi* of such cases. Thus much, however, may be said in the way of definition.

Actions of Habit (at least the class we are speaking of) are the results of an intelligent volition developed in sudden perception, *rational in its nature*, and which must be therefore included in the idea of Intelligence.

The term, *Habit*, as signifying an essential cause, or principle of action, is to be distinguished from the same term as expressing the idea of proneness, derived from reiteration; since this determination of the mind, or proneness, is equally applicable to analysis, and particular modes of thought, as to the principles which give rise to actions without any reasoning deduction. The sense of the term *Habit*, which we have been considering, is that of an

essential cause of those actions, whose production is not marked by any sensible reasoning operation.

Proneness indeed properly belongs to the Affections, or Will; and must, in the present case, be considered distinctly from the Faculty of Intelligence: in the same manner as we have seen that Desires are to be considered distinctly from Perceptions, in the case of Instinct. The Will may, in certain cases, be so strong as to overpower the whole mental region; but in these cases it is rather to be considered as the occasion than as the cause of action or inaction. Will supplies the motive,—Intelligence the means: in this respect they are or ought to be co-ordinate; if the balance be destroyed the Principle of Intelligence is either perverted or rendered inert.* The proposition of M. Cuvier illustrates this, when he says, “*Le sentiment de la peur suspend dans ce cas le mouvement des muscles ou les excite, sans que l’intelligence paroisse y prendre la moindre part.*”† But it furnishes, I conceive, no proof of the essential absence of Intelligence in any acts which may be executed in such states of disorder: but merely of the perversion or interruption of the proper agency of Intelligence. M. Cuvier, indeed, affords an explanation of this phenomenon, when he says, in a previous note,‡ “*Les dispositions et les besoins ne conduisent pas nécessairement à des actions aveugles,*” &c. The sentiment of fear is evidently one of those dispositions which, if not controlled, are capable of bearing down every power of the mind.

That this circumstance of propensity or disposition, is very generally instrumental in modifying habits, need scarcely be remarked; and when taken into the consideration of the subject, it may assist in their subdivision into particular classes.

Habits may be considered generally under two distinct classes: voluntary and involuntary. The former we have already dwelt upon. The latter may be illustrated by the instance of the

* I have all along supposed such a co-ordination of affection, or will, when treating of Intelligence; since the will supplies motive or desire, without which it is impossible for the intellect to act.

† *Dict. des Sciences Nat.* tom. xxiii. p. 540.

‡ *Ibid.* p. 528.

involuntary habit of closing the eyelid. This action does not appear to be instinctive, as new born children do not close the eyelid till experience indicates the necessity of so doing. There appears to be an obscure degree of freedom in this act, probably forming one of the beginnings of Human Rational Freedom ; for were the mere utility of protecting the eye from the overpowering effects of light, by alternations of shade, to be alone considered, the action might as well have been instinctive as habitual. The fact however supplies an important demonstration that the essential cause, both in habit and instinct, is intelligent : notwithstanding the difference with respect to consciousness. Some actions of habit may be considered as partaking of the nature both of voluntary and involuntary actions. Thus while the motions of attitude are voluntary ; the grace of the motions, if habitual, is involuntary, although acquired by intelligence. In this, as in other cases, the final cause requires that such actions should not, in man, be instinctive ; in order that they may thus be made *objective* to his mind. To effect this, although his intellectual power gradually approaches nearer and assimilates itself to the form of an active power, the act is nevertheless done in *freedom* ; by the aid of reflection, which, as we have said, is but an attribute of the operation of Free Intelligence. The progressive formation of Habit is itself a proof that a mode of Intelligence is the efficient cause in the actions which are its products.

[*To be continued.*]

ART. XXI. *Abstract of a Memoir on the Physiology of Helix Pomatia.* By B. GASPARD, M. D.* *With Notes by T. BELL, Esq. F. L. S.*

[Continued from p. 100.]

§ 20. Contrary to Swammerdam's representation, these mollusca propagate their species by close contact, raising themselves foot to foot, and remaining in that situation, pressed firmly together, for a whole day or longer; and at the same time mutually exciting each other with the little dart or needle described by Lister and Duverney. They afterwards retire, partially and gradually, into the shell, from which they do not again emerge until the following day, when they resume their ordinary habits. After a week or two the act is repeated, and subsequently a third time.

The little dart mentioned above is formed in the male organs; I have found it in the *vas deferens*, with the point directed forwards. It is a small very white body, brittle, and having a saline appearance, of a pyramidal and quadrangular form, or rather having four lateral plates or wings; it effervesces with acids, and is probably composed of carbonate of lime. I have sometimes found this winged dart, sticking like an arrow, against the genital orifice of the opposite Snail. It exists in the *Helix Arbustorum* as well as in the present species.

The interval between the first union and the deposition of the eggs, has varied within my observation, from twenty-five to thirty days. After this period, one only of the two Snails forms a hole in the earth, sheltered from the rain and from drought, and after rounding and enlarging it, introduces the head and neck, and lays the eggs. It then carefully closes and cements the upper part of the nest, and abandons it to the care of nature.

Two or three days after the eggs are laid, another union takes place, in which that individual which had not laid, is impregnated in its turn, and deposits its eggs three or four weeks afterwards,

* Magendie's Journ. de Physiol. tom. ii. p. 295, et. seq.

but the former is not fecundated by this second copulation. In short, in all my observations, both individuals do not produce at the same period, but one of them at least twenty or twenty-four days after the other. I have been careful thoroughly to establish this fact, which has escaped former observers, and which in some measure diminishes the miracle of the generation of Snails. It proves them in fact to be hermaphrodite, but not simultaneously fecundated. They are anatomically, however, strictly androgynous.

It is usually about the middle or latter end of May that they unite, to produce their eggs in June. I believe they generally lay but once in the year; though I have known one produce a considerable, and almost equal number on the 20th of June, and again on the 4th of August. I have also found two united in September, doubtless after a previous generation: and those which laid their eggs in the winter over my fire-place, had probably produced during the previous summer.

The number of eggs at each laying varies, as far as I have observed from 25 to 80. They are found in the nest, agglomerated, and slightly stuck together with mucus; they are spherical, hard, opaque and white; about the size of small peas, and considerably resembling the berries of the misseltoe. They are composed entirely of limpid albumen contained in a membrane which is somewhat solid, and fibrous. Each egg weighs about three grains and a half. They sink in water, become wrinkled in a dry atmosphere, and are preserved only in a moist situation. Placed on burning coals, they swell, crackle, and become charred without much smell; they freeze at a similar degree of cold as the white of birds' eggs; though the mucus which envelopes them freezes at a higher temperature. Boiling water coagulates the albumen, and gives it a bluish tinge. Nitric acid turns the mucus of a yellow colour, instantly dissolves the opaque envelope with a brisk effervescence, and coagulates the albumen without the disengagement of gas.

The eggs deposited in the earth and exposed to damp, develop themselves without incubation like those of all the cold blooded animals, but more or less quickly, according to the temperature

of the atmosphere. Thus it took place in twenty-one days over my fire-place, where the constant temperature was about 20° R. (77° Fahr.) as also in the garden in summer where the thermometer was at 28° (95° F.) in the day, and 10° (55° F.) in the night. On the contrary, those eggs which were constantly exposed to 12° (60° F.) were not hatched till thirty-one days, and at 6° to 8° (45° to 50° F.) not before forty-five days. Similar experiments on the eggs of Frogs afforded analogous results.

I am certain that those of Snails are not developed, but go on to putrification, either when placed in water, or in a stagnant damp atmosphere, under a vessel inverted over water. A few days before they are hatched, the eggs become hard, opaque and white like chalk, sometimes on one half, at others over three quarters, or over the whole globe; at length the little animal open with its teeth the white calcareous envelope, and comes forth with its soft tender shell, consisting only of one volution and a half, having its four tentacula, two of which are furnished with the black point; and its heart may be seen beating through the shell. If this little shell be thrown into an acid, even before it has left the egg, it is dissolved with effervescence.

The animal, at its first exclusion, lives only on the pellicle of the egg, the whole of which is eaten. It is appropriated to it, like the milk to the young of Quadrupeds; the yelk of the egg to those of Birds, of Chelonian and Saurian reptiles; the glaïre of the egg to Batrachian reptiles, &c. In fact, this pellicle consisting of carbonate of lime, united with an animal substance, is necessary to produce the calcareous secretion of the mantle, and to consolidate the shell, at present too soft to be exposed without injury. When this envelope is wholly eaten, the little snail is nourished only by the more or less vegetable soil which surrounds it, and in which it continues to find materials for the secretion of the shell. It remains thus concealed under ground in the nest for more than a month, when it comes forth, feeds on vegetable matters, and especially on their decayed remains, and even yet returning frequently to an earthy aliment. Its increase is rapid during the first year, and it has acquired considerable size by October, when it hibernates and forms its operculum for the first time. I am not acquainted at what period it begins to propagate.

§. 21. The blood of these animals must now call our attention for a moment. This is not only contained in the organs of circulation, but is poured out, particularly whilst the animal walks, into the cavity containing the digestive and genital viscera, which are bathed in the blood; so that on cutting through the separation between the trachæa and abdominal cavity, an abundant and continued jet of this fluid is thrown out. Whilst the animal remains at rest, and retired into the shell, the blood is not poured out in the same manner.* This phenomenon struck me forcibly, and I know of nothing analogous to it in other animals. The blood is rather thick, but without viscosity; it has a faint smell, a slightly saline taste; and is so abundant that each adult individual contains not less than a dram and a half. It is of a delicate blue colour, which is neither altered nor modified, by change of aliment, by asphyxia, or by hibernation. It is miscible with water, but of greater specific gravity, and falls to the bottom in visible streaks or entire drops. When exposed to the atmosphere, it does not spontaneously congeal, like that of vertebrated animals, but it separates by rest into two distinct fluids, the one blue, which swims at the top, the other colourless and opaque, remaining at the bottom of the vessel; in a few days it decomposes with fetor. It is unaltered by muriate of barytes, and by alkohol,—is simply discoloured by potash; and by vinegar, and other weak acids. But acetate of lead, nitrate of silver, and still more, ni-

* This conclusion of Mons. Gaspard, I thought too curious and singular for me to pass it over without submitting it to the test of direct experiment. I have therefore repeatedly and carefully injected the vessels of these animals by the *aorta*, but have never found any communication between the circulating system and the visceral cavity. In fact, the fluid which the author mistook for blood, is, I believe, nothing more than a large quantity of serum, effused for the purpose of lubricating and protecting the viscera, and similar to that which serves the same office in the thoracic and abdominal cavities of other animals. May not the quantity which thus fills this cavity in the Snail, be intended, by affording, as it were, a reservoir of moisture, to provide against the effects of extreme heat and drought, during which they often retire for a considerable time into their shells, in a state of partial torpidity? Thus performing an office somewhat analogous to that of the fat in vertebrated animals, which being absorbed during a long period of abstinence, supplies the place of food.

T. B.

trate of mercury, occasion a copious dense precipitate. Boiling water, sulphuric and nitric acid, coagulate it strongly, like albumen.

Lister saw with the microscope in the blood of these animals, the globules which are met with in that of most others; and Messrs. J. L. Prevost, and J. A. Dumas, in confirmation of this remark, have lately ascertained that these globules have a diameter one-third greater than those of man, the dog, the hog, the rabbit, &c. But what is most surprising in the researches of these micrographers, is, that they found the globules in the blood of the Snail, spherical, as in the Mammifera; after having observed them to be elliptical in Birds, Reptiles, and Fishes.

I was curious to know the effects of this blood when introduced into the circulation of a warm-blooded quadruped. For this purpose, on the 26th of August, 1822, I injected three ounces of the blood of the Snails, made tepid, into the jugular vein of a Leveret, weighing about a pound and three quarters, from which I had previously taken two ounces of blood. At each injection the respiration was accelerated, the animal appeared distressed, and after the experiment it remained for more than an hour, in a state as it were of intoxication or stupor, with the head turned over the left shoulder, and incapable of action. The pulsations of the heart were strong and frequent. These symptoms disappeared by degrees, and in about three hours, it walked almost naturally, although evidently weak, and even recovered its appetite. In the evening, however, the nervous symptoms returned, particularly the contortion of the head, and it died during the night without any alvine evacuation. On opening the body, the brain was found quite healthy, as well as the abdominal viscera, including the gastro-intestinal mucous membrane; the pericardium filled with reddish serum, the heart and lungs studded with numberless points and spots of inflammation. Thus, it appears that the extreme vessels could not accommodate themselves to the large globules of this blood, and that the result was an inflammatory congestion in the lungs and heart, where it was accumulated in more considerable quantities. On the existence of a similar obstacle in the brain, doubtless depended the nervous symptoms,

analogous to those which MM. Prevost and Dumas observed to take place, in consequence of the transfusion of blood with spherical globules, into the circulation of animals having blood with elliptical globules.

§. 22. According to Swammerdam, the two larger tentacula of the Helices, have at the extremity a true eye composed of aqueous and vitreous humours, a crystalline lens, an optic nerve, the choroid tunic, &c. This naturalist therefore, followed by Lister, Rhedi, Spallanzani, &c. considers them to be endowed with sight. I have made many attempts to elucidate this point, and I must confess that they have all of them proved to me that they are totally devoid of this sense, and in every respect insensible to light, walking and climbing as correctly in the night as by day light. I have found that they do not perceive obstacles placed in their way until they touch them. Deprived of the tentacula, they guide themselves with equal certainty as before. In a word, I find in these pretended optical bodies, nothing more than the organs of an exquisite sense of touch, with extreme sensibility to heat, dryness, moisture, to the slightest shock, or the least agitation of the air; and this arises from a large nerve which is expanded over the extremity.

They appear also to be deaf as well as blind; being totally insensible to the most acute sounds, although instantly perceiving the slightest vibration communicated by the foot to the ground.

With regard to the sense of smell, it is true that we have it asserted on the authority of Swammerdam and Lister, that they are directed by the smell towards cheese placed near them; but I have never been able to confirm this. In short, I have only been able to ascertain the existence of the sense of taste, and that of touch; the latter of which they possess in an extreme degree of delicacy.

(The experiments which Monsieur Gaspard relates on the reproduction of the parts of Snails, offer no results sufficiently different from those recorded by Spallanzani, to render it necessary to transcribe them.)

ART. XXII. *Some Observations on the Nomenclature of Ornithology; particularly with reference to the admission of new genera.* By N. A. VIGORS, JUN. Esq. A. M. F.L.S.

[In a letter addressed to the Editors of the Zoological Journal, May 1, 1824.]

GENTLEMEN,

IT has been frequently observed, and the justice of the observation has been admitted by every true lover of science, that the progress of Natural History has been considerably retarded by the overweening importance which has been attached to the province of nomenclature; by its being considered the end, not the means, of science; or, to use the words of a distinguished naturalist of the present day, “a department of Natural History,” not “a convenient instrument whereby an acquaintance with it may be more easily cultivated.”* Not only has the general inquirer into subjects of scientific research been deterred from entering beyond the surface into the secrets of natural science in consequence of the forbidding aspect under which it has been represented, but the views of many a zealous naturalist have been perverted by the false light under which it has been exhibited, and his co-operation in the true labours of the science rendered abortive. When a student who aspires to an acquaintance with nature is taught, that to display her productions in his cabinets according to a favourite or fashionable code of arrangement, to assign each individual its respective name, and to trace the various synonyms that may have been conferred on it through all their windings, is the ultimate object

* *Horæ Entomologicæ*, p. 24. See also p. 10. “The almost exclusive attention which has of late years been unfortunately lavished on *Nomenclature* and *Systematic Arrangement*,—on the means in short, and not on the end of the science,—has with ignorant persons diminished the importance of the study of Natural History itself.”

of all natural research, his mind becomes wedded to a subordinate branch of his subject, and is drawn away from the contemplation of its sublimer truths. He becomes conversant with artificial, not natural, systems. It is upon the labours of man that he dwells, and not upon the works of the creation. He dwindles, as it were, into a mere compositor of the volume of nature, artificially putting together the symbolick words that stand for ideas, while the ideas themselves in their true spirit and meaning escape him. And thus the exertions which, properly directed, might have tended to explain the laws, and elucidate the operations of nature,—which might have been devoted to a study purely intellectual,—are lost in a pursuit which is strictly and exclusively mechanical.

But even the value of Nomenclature itself, which, it is needless here to observe, is an efficient and powerful instrument towards the progress of the science, inasmuch as it is the necessary organ for the communication, and of course for the acquisition of knowledge, is deeply injured by the injudicious endeavour to elevate it beyond its intrinsick consequence, and to place it on an equality with the science itself. It is the common and natural course of our feelings to imbibe a decided partiality for that which it has cost us some pains to attain. And the student in Natural History who has been led to conclude that nomenclature should be the main object of his pursuit, and who has been accustomed to study it with reference to a particular form or system, naturally feels a prejudice towards the system into which he has been initiated; he looks up to it with somewhat of a sacred reverence; he becomes intolerant of every change that may affect it, and hostile to every innovation. To unlearn, even partially, what he has acquired, he often finds a more difficult task than to enter upon his researches from the commencement. His pride, in fact, is enlisted on the side of his partialities; and indulging a happy feeling of contentment with the actual state in which he himself found the science, he feels a jealousy towards the admission of any new light, which, while it tends to clear away the mists of the prospect before him, serves equally to expose the darkness in which he had hitherto been involved. Hence it inevitably fol-

lows, that nomenclature and systematick arrangement are despoiled of their true value. They remain stationary, while knowledge is advancing. The machinery which was eminently serviceable in its application to nature, while her productions were limited and of moderate extent, becomes inefficient to operate on the gigantick mass that every day accumulates before us : and that blindly partial bias, which admits no expansion to its size, or addition to its powers, renders it useless to any practical purpose.

A few brief observations on the erroneous notions that prevail upon this subject, may not be uninteresting to the readers of your journal : and I shall devote the pages, which your kindness has placed at my disposal, to some remarks which strike me as bearing upon the point in question ; confining myself however to that branch of Zoology, on which, having lately devoted some attention to it, I feel myself more competent to hazard an opinion.* The remarks I have to make will, of course, contain little novelty to the scientifick Ornithologist, who is as much above those prejudices and narrow views which I would reprobate, as beyond the scope of any humble observations which I might be enabled to advance. But there are younger students to whom they may be serviceable. And when we see elementary treatises published every day, which represent the science in exactly the same state of advancement at which it stood near a century back ; when we see the press teeming with dissertations which speak the language only of the same remote period ; when we see the partizans of the same antiquated notions declaiming every where against the introduction of new views and new knowledge, asserting that every species in Ornithology is likely, under the modern modifications, to become a new genus, and that the number of new names that are creeping in tend but to perplex and confound, and by their multi-

* We may shortly expect some convincing arguments on the same subject, as far as it relates to the groups of Entomology, from the pen of the distinguished authour of the "*Horæ Entomologicæ*." I here mention this circumstance more particularly, as, from that gentleman having, with his usual kindness, communicated to me some time since the early sheets of his "*Annulosa Javanica*," now in the press, the prior right of having occurrpied the same line of reasoning as that which I now pursue is justly due to him.

plicity to deter the student from prosecuting his researches in the science ; when we see them so tenacious of the very form of their nomenclature as to resist any alterations in names or disposition, even where error has been detected and universally acknowledged—more willing to perpetuate confusion in our ideas of nature itself, than to alter the terms of that nomenclature which they have erected into so important an idol—when we see, in short, nature thus made to bend to the views of man, it becomes every one to enter his protest, however feeble, against doctrines so pregnant with danger to the views of the student, and so subversive of the sound principles that regulate the science.

Were it the fact, as is asserted, that every species in Ornithology is likely to be formed into a genus ; or, to take a more just view of the subject, were it the case that all the species are so far distinguished from each other as to admit no grouping together, and that it becomes necessary to confer on every species a generick name and character which will at once point out its own place in nature, and its distinction from every other known group, I can not decide otherwise than that, while so paramount an object is gained, it would be but a feeble objection to assert that names are in consequence multiplied. He who is deterred from prosecuting his researches into any department of natural science by those technical difficulties that may impede his earlier steps, but which when surmounted will be found in the end to accelerate his progress, is not likely to add much to the value of science, and his recession from her paths is not much to be regretted. The same difficulties attend every object of human research. Take any subject of inquiry ; take language itself for instance, and say, will any man shut himself out from the knowledge of the history, of the poetry, of the philosophy of any clime or people, from a dread of the innumerable terms which he must acquire before he attains the perfect use of that instrument which is to guide him to his information. Knowledge does not come to us intuitively, nor is it to be seized upon, as it were, by storm, and at the first approach. Our advance must be gradual, and our ultimate success attained chiefly by assiduity and perseverance. The true question to be decided on

all such points is not whether the means by which we arrive at knowledge present, at first sight, a formidable appearance that may affright the indolent and unenterprising; but whether it affords the easiest progress to the object in view. That which appears an obstacle is often a stepping-stone to our advancement: and the height which to one man seems insurmountable, is, to the man of enthusiasm, who masters the ascent, the means of extending his views, and giving him a commanding prospect over the field of inquiry. But this is not the point at present under consideration. Nomenclature, as an instrument to facilitate our knowledge, should certainly be as simple as is consistent with its powers and efficiency. And how far the nomenclature of the present more advanced state of Ornithology errs in this respect, how far it has become too complicated, and the introduction of new terms has introduced confusion into the science; how far, in short, every species, as is alleged, has become, or is likely to become, a genus, may be determined from the following brief statement of the fact.

At the period when Linnæus published the last edition of his "*Systema Naturæ*," the number of species described in the department of Ornithology amounted to nine hundred and twenty-seven. These he thought it necessary to divide into seventy-eight genera, thus leaving less than twelve species on an average to each genus. The number of species which have come under the observation of the naturalists of the present day exceed five thousand; having increased beyond the number of those known to Linnæus in a greater proportion than that of five to one. We might reasonably have inferred that the number of generick names would have increased in at least an equal ratio. And yet what is the fact? In the *System of Ornithology* published by M. Vieillot, who has been considered the greatest innovator in this respect, the number of his admitted genera is no more than two hundred and seventy-three. These we may increase to three hundred, for the sake of using round numbers, and in order to embrace some genera established by M. Temminck, and other later ornithologists. Taking then the same estimate as before, we have somewhat less than seventeen species at present to a genus. The

natural inference that we may draw from this calculation is, that the nomenclature of the present day is considerably less complicated than it was in the days of Linnæus; and that so far from the admission of these genera tending to create confusion, we actually require the addition of upwards of one hundred more to those already in our possession, if we wish to place our nomenclature on an equality, with respect to the proportion the number of genera bear to that of species, with what Linnæus thought it necessary to establish. In fact, the violent outcry against new genera seems to originate in our ignorance of the actual advance of the science. Contented with the limits which it possessed in our earlier acquaintance with it, we are unaware of the overwhelming influx of new forms and new species, which render it a matter not of choice, but necessity, to institute new departments to which they may be assigned. In condemning therefore the introduction of new names and genera into Ornithology, it is not against the naturalist that we raise our voice, who is forced to invent new names and stations by which he can embrace the incoming productions of nature. It is against nature herself that we exclaim, who, however fixed and stagnant may be the state of our own knowledge, ceases not to pour forth a continued stream from her exhaustless sources, as if in derision of our ignorance, and to expose the impotence of those systems with which we would pretend to circumscribe her.

It is evident that were we to restrict the number of genera in Ornithology to that which was instituted by Linnæus, or even increase it by the addition of those genera which his strict adherents have latterly been necessitated to admit,* we should have, on an average, about fifty or sixty species to a genus; a proportion which every man of science, and particularly those who are conversant with the sister departments of Natural History, will acknowledge to be inadequate to the general purposes of nomenclature. But even this is the most favourable point of view in which the opposite side of the question to that which I espouse

* The number of genera admitted into the last edition of Dr. Latham's "Synopsis," amounts to one hundred and eleven.

can be represented. Many of the Linnean genera, it is to be recollected, are limited to a single species; many contain but two or three; and some do not extend beyond ten or twenty. It consequently follows, that a considerable number will embrace more than the average proportion, and that some will extend even to hundreds. A single example will illustrate this point; and I shall select the Linnean genus *Falco* as an instance, not so much because it is the most copious in species, for in this respect it falls far short of many others, but because it is one where the enemies to what is called innovation take up their strongest position. The number of species contained in this group, which, in the days of Linnæus, it may be remembered, did not exceed thirty-two, amounts, in the last edition of Dr. Latham's "Synopsis," to two hundred and forty-seven.* Now let us suppose that a student has a specimen of a bird before him, which he has ascertained to appertain to the *Falco* of Linnæus, and whose name, and particularly whose place in nature he wishes to discover, it follows, that he must compare his bird with the descriptions of two hundred and forty-seven congenerick species, before he can be satisfied with accuracy respecting its proper denomination. I here state no imaginary or fictitious case. It is one of every-day occurrence.

Now let us suppose, on the other hand, that, according to modern views, the great genus of Linnæus, or what perhaps more properly may be termed his family, is divided into five primary departments, distinctly characterized, and that these are again subdivided into five groups equally defined in character, which contain under them, at the highest estimate, we will say twenty species.—I speak here of course only for the sake of illustration; these proportions must considerably vary.—In this case, then, the student has to compare his bird, in the first instance, with the

* I content myself with the number actually admitted into our best standard work on Ornithology. I could encrease this number to considerably more than three hundred, were I to include the species daily described, and which have become known to us since the publication of that part of Dr. Latham's work which comprises the *Falcons*. The number in the text is quite sufficient of itself to answer the purpose of my reasoning.

described characters of the five primary departments. He again descends in order to the descriptions of the five subdivisions or generick groups contained in the selected primary department ; and lastly, he makes his reference to the twenty specifick descriptions. In all, at the very extreme, he has thirty points of comparison to which he refers the bird before him, instead of two hundred and forty-seven, through which he would be obliged to wade according to the ancient system. I appeal to the candour of those who are the most strongly opposed to my notions on this subject, to decide which of these two is the simplest or most expeditious mode of proceeding.

But in the former instance the student has arrived at a knowledge of the name of his bird alone : and in this information his labour ends. There is however a more important species of knowledge to which he has attained no clue. The groups of *Falconidæ*,—such I hope I may be allowed to call them,—though united in affinity by their leading characters, are yet distinguished from each other by many essential differences in manners and organization. Their structure is more or less powerful, their habits more or less destructive : they evince a greater or less docility in submitting themselves to the commands of man, or, in the language of Falconry, they are more or less “noble.” Some pursue a superiour prey, some a prey of the meanest description ; some hawk on land, and some on the waters : some are bold, though of the smallest size ; some, though of considerable dimensions, are slothful and cowardly. A number approach more or less closely to the typical character of the family, or again deviate more or less remotely from that type, and approach the *Vulturidæ* on the one hand, or the *Strigidæ* on the other. The modern plan of arranging this comprehensive group has a reference to all these important characteristicks ; and the student who determines the name of his bird by this mode of nomenclature, determines at the same time its station in nature. He ascertains the purposes for which it is called into existence, and the part which it sustains in the general economy of the creation. I here again appeal to the candour of my warmest opponents on such points, whether such a mode of proceeding, while it is at once more simple and expeditious than

that which they advocate, is not at the same time more consonant to those scientifick views which ought to direct the naturalist.

Here however I shall be met by the observation, that the object to which I have just adverted, that of distinguishing the greater group into its characteristick departments, is attained by dividing it into sections, expressive of the leading peculiarities of each. This practice, if generally followed, would decidedly be an improvement upon the ancient regime: and the partial adoption of it, for it is a gratuitous assumption to say that the strict adherents to the Linnean nomenclature universally adopt it, proves most forcibly the inefficiency of the nomenclature itself, while it retains its original form without any modification, to the purposes of scientifick arrangement. But does this mode of arrangement answer our ideas of the brevity and clearness which should distinguish nomenclature, or correspond with the principles which Linnæus laid down for that art. Let us suppose, for instance, that we possess two species of the same family of *Falconidæ*; according to the mode of nomenclature now under consideration, we call them, we will say, *Falco albus*, belonging to the third section of the genus, and *Falco ater*, belonging to the fourth;—is this mode equally simple, equally perspicuous, equally indicative of the natural affinities of the birds before us, as that of denominating them at once by the distinctive names of *Astur albus*, and *Milvus ater*? But a serious objection arises to the use of a number in designating a group;—it must necessarily be subject to variation.* What is the second group at an early period of our knowledge, may be the third at a more advanced stage; an intervening form may arrive to separate two sections, which had before been conterminous, and the numeral designation of one must consequently be changed. This difficulty has actually been felt, and a partial remedy for it has been adopted. A fixed name has been applied to each section, instead of an inconstant numeral. The names

* Were the knowledge of Natural History so far advanced as to enable us to adopt the quinary arrangement suggested by Mr. Macleay, in his “*Horæ Entomologicæ*,” the objection to numeral subdivisions would not exist. The number of every department, or subdepartment would then be determined. But in the present infant state of zoological science we can not look for that precision which belongs only to a state of perfection.

however thus applied are not scientifick, but provincial, as if to make a compromise for the concession. But is not this, in effect, the very process which the sticklers for what is called the established nomenclature affect to condemn? The follower of the modern views in science discovers, in an extensive family, a distinctly characterized group; he calls it a genus, and designates it by a scientifick name. The adherent to the Linnean nomenclature acknowledges the same distinct group; he calls it a section of the Linnean genus, and designates it by an unscientifick name. The process is precisely the same, the terms made use of alone are different. Here again I will ask which mode of nomenclature is more simple, more instructive, more truly scientifick,—we will take the same examples as above,—that of describing our birds as *Astur albus* and *Milvus ater* of Ray and the older Ornithologists, or as *Falco albus*, belonging to the section “*Les Autours*” of M. Temminck, and *Falco ater*, belonging to the section “*Les Milans*” of the same authour.

One of the chief advantages which Linnæus conferred upon science was the philosophical principles on which he established the art of nomenclature. However he might have been indebted to some of his predecessors, to our own Ray in particular, for his original views on this subject, he certainly gave the final polish to the system, and established it on the most lasting foundation. The edifice which he lived to complete both in its bolder outlines, and its minuter details, was simple, solid, beautiful;—a perfect Dorick structure. Perhaps when we consider the varying nature of the science which he cultivated, varying as the materials with which it is conversant increase or become more known, this portion of his labours may be considered that which is least likely to be superseded by the more extensively informed views of his successors, and that on which his reputation may ultimately be found chiefly to rest. One of his principles in this art appears to me eminently simple and efficient, that of designating every separate production of nature, above the rank of an individual, by a generick and specifick name; the former to point out its station in nature, and its distinction from every other group; the latter to indicate its separation from every other species that may co-operate with it

in the same natural station. The advantages derived from the succinctness and perspicuity of this mode of nomenclature are strongly apparent, while the uniformity which prevails throughout it, makes the language of science in which it speaks, an universal language. Now if it should occur, that, owing to the increase of materials or of our knowledge respecting them, the terms assigned to certain groups should become too vague and limited in their application, with reference either to the magnitude of the group itself, or the variety of forms that enter into it,—as, for instance, where an original genus receives such a numerous accession of species, and such an addition of new forms, as renders the name, as generic, inapplicable to them all;—it becomes a question whether we should make an alteration in the terms of the nomenclature itself, or violate the principles which have been established for its direction. Where the case is one in which the reputation of Linnæus is concerned, I feel no hesitation in declaring, that the honour of that great name is more effectually consulted, by adhering more strictly to his general principles, than to the particular name which he may have conferred on any group. Nomenclature itself is variable. From its very nature it cannot remain stationary: it must be enlarged to suit the increasing bulk of materials which it is meant to regulate; it must be altered to meet the more accurate information of every day. But the principles which direct this art never vary. Standing on the philosophical basis upon which they were placed by Linnæus, they are suited to every change of the science; in every alteration of views, in every modification of knowledge, they remain the same, unchanged, unchangeable. Ought it not to be the undeviating principle therefore to which we should adhere, and not the inconstant name?

Coming then to the case immediately before us, it is admitted on all sides that the vast number of species, which have latterly been added to the genus *Falco* of Linnæus, have rendered that term as generic, and the character assigned to it, too vague and indefinite for the purposes of nomenclature without some modification. It becomes necessary either on the one hand, to make *Falco* a family instead of a genus, and to admit new generic

names for those divisional groups of it, which possess a naturally distinctive character : or on the other hand to retain the name as generick, but with an awkward and unartistlike reference to its sections or subgenera, — a process whereby the simplicity and brevity so conspicuous in the Linnæan nomenclature is necessarily violated. In either case an infringement must take place on the system of Linnæus ; and the point of decision is in what particular we must desert that system. I myself feel no hesitation in arranging myself on the side of those who would retain his group and the character he has assigned it, but under the more comprehensive title of family to suit its increasing bulk, and adhere in more material points to the paramount principles which he has established for the art. In this process it will also be seen that the only alteration which takes place, is in the title of his great group, the term family being substituted for that of genus ; while his own generick term *Falco* is still retained for that division of his group which he meant to be typical in it, and which, even thus limited, contains more species at the present day, than what constituted his original genus. Neither have I any doubt, that this is the very step which that great naturalist would himself have taken, could he have witnessed the vast improvements that have latterly taken place in Ornithology. I form this judgment from his practice in those other branches of Natural History, where his knowledge was more extensive and more defined, and on which he lived sufficiently long to confer a higher polish. I shall take another opportunity of entering into a more detailed examination of this point ; being of opinion, that even in his own mind his groups in Zoology, were intended to form but the first outlines of his system, to be filled up as time and opportunity increased the necessary information ; and that the term *genus* was not intended to bear the same strict acceptation, when referred to them, as when applied to groups, where he was more accurately informed, as for instance in the department of Botany.

Hitherto I have examined this subject with reference only to the laws of nomenclature. But some arguments have lately been brought forward against the institution of new genera, which aim at the very essence of the science itself. Advanced by authority

of the highest rank, they are adopted implicitly by those who have not leisure or inclination to think for themselves, and are hailed with triumph by all who contend for the ancient and limited landmarks of the science. It is necessary to give these arguments a distinct examination. Were they allowed to pass current, the discoveries that every day take place of the operations of nature, and of the principles that prevail throughout her works, as well as the inferences that result from these discoveries, would be rendered totally abortive and unprofitable.

M. Temminck, whose name is deservedly high in the ranks of Ornithology, has rendered himself conspicuous by his opposition to the admission of the greater number of genera established by his contemporary naturalists. The main objection which he urges against them is, that, however distinct some species in the new genus may be from the generality of the group from which they have been separated, other species are so united to it by a gradual approximation as to render it impossible to draw a line of distinction between the new group and the old. He lays particular stress on the passage that thus takes place between these continuous groups, and in every instance he draws the conclusion that the new genus must fall, where such an intervening passage exists. This doctrine is so particular a favourite with him, that he dwells upon it on every opportunity, in almost every page of his works, in every succeeding volume that is the fruit of his valuable labours.* It is the knowledge of these intervening gra-

* A few examples, taken almost at random, from the "Manuel d'Ornithologie," will sufficiently explain the Professor's views on this subject. "Le genre *strix*, si bien caractérisé—a aussi dû être subdivisé récemment en un grand nombre de genres nouveaux,—les espèces étrangères rendent ces divisions absolument nulles, elles présentent un passage sans intervalle assignable, et n'offrent pour tout moyen de classification méthodique, qu'une grande série d'espèces."—p. 79. "Daudin a proposé les genres *Icterus* et *Cassicus* pour ces oiseaux Américains: M. Vieillot en ajoute encore d'autres, mais les limites de ces genres nombreux ne peuvent être fixées avec précision; le passage des uns au d'autres a lieu par nuances presque imperceptibles. Je propose conséquemment de réunir tous ces oiseaux d'Amérique dans le seul genre *Icterus*."—p. 128. "Les méthodistes ont essayé de classer ces oiseaux [les Gros-becs] en plusieurs genres,—. C'est vainement qu'on inventerait encore double et triple de noms nouveaux pour former des groupes strictement méthodiques.—J'ai mis

dations, which according to his arguments thus overturn the speculations of the institutors of new genera,—a knowledge, also by his account, to be attained alone by years of laborious research, and a personal acquaintance with every production that has hitherto been brought to light from the stores of nature,—a knowledge, which his own good fortune and his unexampled industry have enabled himself to attain,—it is this knowledge alone, he asserts, that can entitle a naturalist to determine the situation of any group in nature, or to speak of the mode by which it may be classed, in the language of authority. With considerable, and perhaps justifiable, self-complacency, he adds, that it is this knowledge which draws the line of distinction between the true expounder of nature, and the pseudo-naturalist of the cabinet and the library.

tous mes soins a comparer plus de cent espèces étrangères, avec nos espèces indigenes; le résultat de cet examen m'a confirmé dans l'opinion qu'il *existe un passage graduel, sans demarcation aucune d'une espèce a l'autre.*"—p. 342. " Rien n'est moins selon la nature, que de former un genre distinct pour le pic a trois doigts d'Europe et pour un petit nombre d'espèces etrangeres egale-ment tridactyles,—ces amis de genres nombreux *n'ont certainement jamais vu quatre espèces de pics de l'Inde, par lesquels la nature semble avoir voulu passer graduellement des pics a quatre doigts aux espèces tridactyles.*"—p. 359. See also p. 422, where the same observations are repeated with respect to the three-toed Kingsfisher.—"*Si je n'avais connu que peu d'espèces de ces oiseaux, je me serais cru en droit d'en faire trois genres distincts; mais il y a une serie presque sans intervalle assignable et sans limites fixes des plus grandes petrels aux plus petits comme des Petrels aux Puffins.*"—p. 802. "Ceux que veulent voir partout des coupes rigoureusement déterminées auraient pu former des petits petrels un genre; on observe effectivement quelques differences—mais ces differences sont encore nulles par le moyen des espèces intermediares.—p. 810. " — tous ces caractères assez tranchés pour *ceux qui n'ont qu'un nombre tres borné d'êtres comme moyen de comparaison*, se reduisent à rien, ou du moins à bien peu d'importance pour ceux, qui, par le moyen de *comparaisons multipliées faites sur toutes les espèces connues de nos jours*, ont pu embrasser une plus grande portion des êtres créés. Alors tous ces caractères, dont la valeur paroît aux yeux du *naturaliste sedentaire et de cabinet* comme moyens propres a servir a leurs divisions strictement methodiques, deviennent *nuls comme ligne de demarcation* entre de tels groupes, et ne peuvent plus servir qu'a établir une *serie naturelle, sans intervalle assignable, dans les espèces d'un même genre.*"—Linn. Transactions, vol. xiii. p. 111.

I shall not delay a moment to inquire why this doctrine, in its exclusive effects, should be applied by the Professor to those new groups only which have been formed by others, and should not be equally levelled at those which he has instituted himself:—and if it is an innovation to create and characterize a new genus, he is himself one of the greatest innovators of the present day. I have too high an opinion of the talents of that distinguished naturalist, and too high a respect for his character, to suppose that he would be influenced by any motives of prejudice or personal importance, or that, if he should fall into error, his lapse would originate in ought but that fervent and enthusiastick feeling by which we are sometimes hurried away too far, in any favourite subject, or particular mode of viewing it. But I must make the suggestion whether this doctrine, if admitted, would not involve a consequence more extensive than we are at first aware of. If that group only should be decided to form a genus, which is distinct in all its parts from every other, which approaches none by some affinity, which hangs upon none by some mutual bond of connection, where shall we find a group so insulated, so wrapped up in itself;—where shall we discover a genus? Will any admitted genus in Ornithology, will any genus of M. Temminck himself, will any genus even of Linnæus stand this test? It is my firm belief, and it is strengthened by the corresponding sentiments of every higher naturalist with whom I have conversed, nay strange to say, by the sentiments of M. Temminck himself, that nature no where presents an absolute division. If there is any truth in the observations I have lately read in your presence, before our Zoological Society, on the affinities of birds, if there is any confidence to be placed in the discoveries that daily come to light, as nature is more explored with respect to these affinities, if there is any justice in those valuable observations on the subject which the Professor before us continually affords us, there is no group in Ornithology, limited or extensive, whether a genus, a family, nay even an order, which stands aloof and totally separated from the rest. There is not in fact any principle more strongly and prominently conspicuous throughout nature, than the beautiful harmony in which her productions gradually pass into each other, and the

uninterrupted continuance of the chain of affinities by which they are indissolubly connected. And if that alone, according to M. Temminck, is to be considered a genus, round which we can draw a line of circumvallation that excludes every other group from its vicinity, we must either realise that imaginary object of dread, which the opponents to the modern nomenclature have fancied,—we must either make every species a genus, for here alone is there a decided separation between groups,—or we must admit but one group, one genus alone, in Ornithology, which we may denominate the genus *Avi*. But it is not here that this inevitable consequence would terminate. Naturalists of a higher order, who have gone beyond the surface of their subject, and have partially raised the veil that has hitherto concealed the operations of nature, have ventured to affirm that there is a still continued line of affinities between the primary departments of Zoology; nay they have gone so much farther, as to assert, that it is impossible to decide where life itself and organization begin and terminate. We know not to what the doctrine of M. Temminck would lead us. Admit it in the first advance, and it will spread beyond our controul; the whole of the creation that comes within our observation—

———— the great globe itself,

Yea, all which it inherit,—

would exhibit an uncharacterized and undigested mass before us, one and indivisible.

This is indeed the point of view in which we see most forcibly how valueless is the knowledge of systems and nomenclature, in comparison of that of nature herself. She exhibits no lines of demarcation, no absolute, no tangible boundaries: while man is necessitated for the sake of retaining, of communicating, of illustrating his knowledge of her works, to give to every group—"a local habitation, and a name,"—and to draw his limits around it. His process must of course in its very essence be not only artificial, but arbitrary; not only arbitrary, but fluctuating. His bounding line, where there is no natural mark to guide it, must wander wherever his own will or his fancy directs, and must vary wherever the increasing bulk of the objects which it encircles, or the increasing knowledge that defines more strongly their relative

position, may swell out or contract its circumference. To place then an implicit, and all confiding reliance upon the perfection of any system, that in its very nature must be thus changeable, thus arbitrary,—to assert its infallibility,—to resist all change in its form, all modifications to its meaning,—would argue a presumption almost as great as to affirm, that man can limit the operations of nature,—that he can bend her to his views, and enclose her within his cobweb systems ;—or that his powers of vision, purblind and contracted as they are, can trace out, nay has already traced out, the interminable windings of those paths, where we are told emphatically “ the ways are past finding out.”

But though nature no where exhibits an absolute division between her various groups, she yet displays sufficiently distinctive characters to enable us to arrange them into conterminous assemblages, and to retain each assemblage at least in idea separate from the rest. It is not however at the point of junction between it and its adjoining groups, that I look for the distinctive character. There, as M. Temminck justly observes, it is not to be found. It is at that central point which is most remote from the ideal point of junction on each side, and where the characteristic peculiarities of the groups, gradually unfolding themselves, appear in their full developement ; it is at that spot, in short, where the typical character is most conspicuous, that I fix my exclusive attention. Upon these typical eminences I plant those banners of distinction round which corresponding species may congregate as they more or less approach the types of each. In my pursuit of nature, I am accustomed to look upon the great series in which her productions insensibly pass into each other, with similar feelings to those with which I contemplate some of those beautiful pieces of natural scenery, where the grounds swell out in a diversified interchange of valley and elevation. Here although I can detect no breach in that undulating outline over which the eye delights to glide without interruption, I can still give a separate existence in idea to every elevation before me, and assign it a separate name. It is upon the points of eminence, in each, that I fix my attention, and it is these points I compare together, regardless, in my divisions, of the lower grounds which imperceptibly meet at the base. Thus also it is that I fix upon the typical eminences that rise most con-

spicuously above that continued outline in which nature disposes her living groups. These afford me sufficient prominence of character for my ideal divisions; for ideal they must be, where nature shows none. And thus it is that I can conceive my groups to be at once separate and united; separate at their typical elevations, but united at their basal extremes.

It is difficult to convey, in terms sufficiently explicit, an accurate definition of abstract notions like the present. We may see the subject clearly ourselves, but not be able to communicate it by words sufficiently intelligible, unless to those who may happen to view it in the same light as ourselves. I shall therefore take a familiar illustration, which comes home to the feelings of every man, and where it will be immediately apparent that strongly marked divisional groups may be kept apart from each other in our conceptions, although we can recognise no absolute boundary lines by which we can say they are separated.

Let us take for instance that period of time which involves the annual revolution of the earth round the sun, and let us divide it into the usual departments which we call seasons. Every man can picture to his own mind the decided characters by which these divisions of the year are parted from each other: he can mark out by definite distinctions those striking periods where the year bursts forth into bud, where it opens into flower, where it ripens into fruit, and where it lapses into decay. He can ascertain the nature of the impressions which each season forces upon his own feelings, he can communicate such sensations to others, and he can embody those natural periods, of whose separate existence he feels conscious, into separate and well characterized divisions, to which he can refer without fear of being misunderstood, under the distinct appellations of Spring, or Summer, of Autumn, or of Winter. But can he at the same time point out the actual limits of these natural departments of the year? Can he fix for instance, in that intervening interchange of season, where the rigour of winter silently and imperceptibly relaxes into the mildness of spring,—can he fix, I say, upon the exact period when the former terminates, and the latter begins? Can he assert at one moment that he is within the precincts of one season, and that, even while he speaks, he has passed into the confines of the other. He may,

it is true, assign artificial limits to each department, and may calculate with mathematical precision the months, the days, the hours, of which it consists. He may even assign reasons for his arbitrary divisions, and prove their probable approximation to the regular interchanges of nature.—And this is precisely as far as the Zoologist can go.—But this is all that is in his power. He never can feel or assert that the character of one season is lost at one particular moment, and gives place to the character of that which succeeds. Here then we have four decided divisions, perfectly distinct in themselves, yet to which we are unable to affix the limits. So it is with the groups of Zoology. They exhibit separate divisions, distinguished by separate characters, but running into each other without any assignable limits : and any man may draw his imaginary line across that “border country,” that “land debateable,” which stretches between the conterminous regions, according as it suits his fancy, or his peculiar views, or as it may accord with the greater or less preponderance of those minour landmarks which serve as an inferiour mode of demarcation in the absence of all natural boundaries.

To make now a more particular application of the remarks I have hitherto ventured to advance on the subject before us, it may be in the first place set down as most consonant to those principles of nomenclature which Linnæus has left us, to designate every species by a generick and specifick name alone, without any reference to sectional or subgenerick divisions. These awkward references would not only interfere with the simplicity that forms one of the most striking beauties of the Linnean mode of nomenclature, but would overturn that uniformity which equally distinguishes it. The same observations extend to the unartistlike substitution, in the place of genera, of divisions equivalent to them which are introduced under the name of sections, or subgenera, or similar appellations. Sections may certainly be formed in genera, for the purpose of making our reference to the species more easy, particularly where the genus abounds in species, founded however on such minour characters as are of no importance in pointing out the natural habits of the birds ; as for instance, in many extensive groups of the *Psittacidæ* and the true *Picus*, where colour may be resorted to as an inferiour, but a useful, guide. But where in extensive

groups such subdivisions are made as bear a strongly marked and decisive natural character that indicates a deviation in each from the typical character of every adjoining genus, and points out its own peculiar and exclusive station in nature, I cannot conceive that the subdivisions so characterized can be considered ought else than genera. There are no terms more definite in their meaning and application than those of genus and species. Every man, whose education extends to the first principles of logical reasoning, is aware of the individual import, and the relative connexion of these words: and the application of them to the nomenclature of Natural History has tended considerably to its simplicity and perspicuity. Every man has ascertained, in fact, that the first more comprehensive group into which species are immediately united by the prevalence of some leading character common to all, is a genus. If then those sections or subgenera, to which I refer, actually do possess such characteristick peculiarities as separate the species contained in them from all other known groups, it follows, that by whatever names we may choose to call them, they are, in the common and philosophical acceptation of the word, strictly and *bona fide* genera. To call them by any other appellation, in order to retain that exact form of words to which we had been accustomed, seems but an awkward compromise with our pride, which will cling to a word itself, while it surrenders its signification. It appears, in short, like an obstinate adherence to an error, which we are aware we cannot retain with justice, and which yet we know not how to relinquish with grace.

Neither does it offer any substantial argument against the separate existence of such generick groups that they are united together at their extremes. I have already dwelt sufficiently on this point, and shall only repeat my conviction that, in every instance where new groups are formed, or old ones subdivided, this union is universally admitted between conterminous groups, but that it does not alter the typical character, or invalidate the separate existence, of any. A group that intervenes between two distinct genera, and partakes of the separate characters of each, so far as to be referable with strictness to neither, assumes itself a decided character. To say that it stands intermediately between two contiguous genera, so as to possess characters in common with

both, and yet to belong to neither, decides as conspicuously its own station in nature, as if we had it in our power to place it within the confines of one or the other. So far then from the discovery of such a group giving us reason to reduce the number of the two conterminous genera, and amalgamate them into one, it rather proves that we have an addition to our original number, and that we possess three genera instead of two.

To enter into any formal observations in defence of the introduction of the numerous new generic terms that must necessarily creep into science by the acknowledgment of new genera, would be an insult to your own enlightened views, and those of your scientific readers. Names may certainly be unnecessarily multiplied and applied to groups which have no distinct existence; errors of various kinds may arise in the progress of science; genera may be founded on a mistaken fact, or established on an accidental, not a natural or constant, difference. These are but the necessary results of our imperfect and near-sighted views. Nay, indiscriminating makers of new genera may arise, who, carrying the practice to the extreme, may bring discredit on the privilege of which they know not how judiciously to avail themselves. But this is the imprudent abuse of a privilege which substantiates nothing against the prudent use of it. You, Gentlemen, and those who think with you, do not require to be reminded, that groups distinctively characterized, and names judiciously and expressively conferred, however they may be augmented, will add to the luminousness, not to the confusion of science. And where is the true lover of nature among us who would not rejoice in the augmentation of new genera and new names even by hundreds, while new species and new forms, as in the last few years, pour in upon us by thousands?

It is unfortunate that the cause which I have attempted to advocate in the foregoing desultory observations, is one which has been long since determined by those, who, if we may be allowed to judge from their labours and experience, are the most fitted to lay down the law, and pass judgment, in all such cases. In claiming for the British Zoologist the privilege of following the modern views, and the modern nomenclature, of science, I only ask for permission that he may communicate his discoveries in sen-

timents, and express them in language, intelligible to those who are confessedly the most eminent Zoologists of our age. It is needless to point out how little until lately this country has effected in Zoology since the times of Ray, in comparison with our continental neighbours, to entitle us to arbitrate on such points. Better is it to endeavour to wash away the national reproach, than to expose or lament it. And I hail with pleasure that spirit which is now beginning to spread itself among our naturalists, and that rising school of Zoology which promises fair to retrieve the past. But let not its earlier exertions be cramped by any narrow restrictions. Let no national jealousies, no rival animosities, interfere to prevent the full expansion of its powers. Let not England disdain that knowledge to which France or any other country has led the way. Natural science, like that nature which it illustrates, should acknowledge no boundary lines:—its views must never be regulated by parallels of latitude or longitude. We may establish a school of our own, and pursue our views according to our peculiar principles: but let us not refuse admission to whatever light may beam upon us from any other quarter. Let us, if we please, select the parent stock of the Linnean system as the foundation of our own,—and a nobler or more perfect could not be chosen;—but let us engraft upon it every scion of value, that may add embellishment to its blossoms, and richness to its fruit, without regard to the clime in which it has been raised, or the particular mode of nurture by which it may have been originally cultivated. Thus shall we go forth to our labours with unfettered strength, and shall enter the field of science at least on an equality with our fellow labourers. But let us enter it, not as rivals, not as jealous competitors, not with opposing views, not with clashing interests,—surely the world of science is wide enough for all,—but as generous co-operators in the same enlightened cause, animated by the same enthusiasm, inspired by the same hopes, and seeking the same reward of our common labours in the advancement of that science, which is equally the delight, and the pride of us all.

I have the honour to be, gentlemen, &c. &c.

N. A. VIGORS.

ART. XXIII. *Remarks on the Animal Nature of Sponges.**By* THOMAS BELL, *Esq. F.L.S.*

MY attention having been called to the question of the animal or vegetable nature of the Sponges, by Mr. Gray's paper on that subject, in the former number of this Journal, I am induced to throw together a few cursory observations on that gentleman's conclusions, and the reasoning upon which they are founded; which, with the relation of a fact bearing immediately, and to my mind decisively, on the point at issue, may perhaps tend in some measure to elucidate the question.

In entering upon the consideration of a subject like this, which involves the nature and relations of a particular group of organized beings, it is of the greatest importance that we should reason only from indisputable and well understood facts, and deduce our illustrations from those species alone which are on all sides allowed to belong to the group, the nature of which is to be investigated. It appears to me that Mr. Gray has been deficient in this essential accuracy and caution, and that it is principally from this cause that his opinions are, as I conceive, erroneous.

Passing his numerous references to the works of Zoologists of former times, which, however, evince a very extensive acquaintance with all that has been written on the subject, I would remark only, that the observations of Lamarck appear to me to deserve much greater attention than Mr. Gray is disposed to pay to them. At least we can scarcely consider him as adopting a mere modification of the character given by Pallas, for the words quoted by Mr. Gray from the latter author, are also quoted by Lamarck himself, for the very purpose of *contrasting* his own opinion with that of the Russian naturalist.

The conclusions of Mr. Gray are principally deduced from the assumption, that the fresh-water sponges (so called), are of the same nature as those of marine growth. Certainly other naturalists have not invariably come to the same conclusion, for the old adage, *quot homines, tot sententiæ*, was scarcely ever more appli-

cable, than to the opinions now entertained of the fresh-water spongoid bodies. They are like Polonius's cloud; a camel, a whale, or what you please. Mr. Gray gives an account of some observations on one of these fluviatile productions, which, from his description, I should fully agree with him in considering a true vegetable; he speaks of the little greenish granules which were washed out of the substance, and which soon after grew "entirely after the manner of vegetables," and having the appearance of the genera of Algæ. "I have very little doubt," says Mr. Gray, "that if the mucilaginous substance of the marine sponge be examined, it will be found to contain similar grains; but not having the opportunity of going to the sea side since making the above observation, I have not been able to verify my idea."

No longer ago than last autumn, being on the Dorsetshire coast, I examined the structure of recent marine sponge with care, and certainly discovered no traces of the granules described by Mr. Gray (and which, in fact, already formed one of the generic characters of *Spongilla*, according to Lamarck). One very important fact however I have ascertained, and that is the power of contraction and dilatation in the tubes of which this substance is composed. I placed a piece of sponge, immediately after it was taken from the sea, in a glass of sea-water; a little dust had settled upon the surface, and upon looking attentively at the water, the regular alternate motion and rest of the dust upon the surface, immediately over the mouths of the tubes, most distinctly and satisfactorily shewed that the water was alternately sucked in and expelled from them. This observation was likewise made at the same time by several of my friends to whom I pointed it out. Whether the contractile power belong to the spongy substance which forms the basis of the tubes, or to the gelatinous crust with which it is covered, I could not of course ascertain: probably however to the latter.

Although perhaps we should not place too much dependance upon chemical analysis in questions of this sort, yet I think it is a fair analogical argument in favour of the animal nature of sponges, that their chemical composition is wholly on that side of the question.

From these observations we may then conclude that the whole of the reasoning upon which the theory of their vegetable nature is built, is derived from a gratuitous assumption, that certain bodies which *have been called sponges*, and which probably possess a vegetable structure, are of the same nature as the true marine species. In opposition to this we have the opinions of the most accurate and observing naturalists, the concurrence of analogy, and the support of plain and intelligible fact: and the conclusion to which I think we must come, is, that they are of a true animal structure;—though it must be left to further investigation to ascertain their relations to other animals, and their exact situation in the scale of animated nature.

ART. XXIV. *Conchological Observations, being an attempt to fix the study of Conchology on a firm basis. By Mr. JOHN EDWARD GRAY, M.G.S.*

§. 1. *On the Structure and General form of Shells.*

IT has been a general source of complaint among Conchologists, that many of the terms usually employed in this beautiful study are extremely ambiguous; owing to the ignorance that formerly existed with respect to the animals which form them, as well as to the mode of their formation; while other terms, the results of a depraved imagination, are so indelicate, as to render the use of them on many occasions improper. In the present Essay which I propose to devote to the consideration of the terms which should be employed in Conchology, while I avoid the latter error, I shall endeavour to obviate the former, by more accurately defining their meaning. For this purpose it will be necessary to take the inhabitants of shells into consideration, which will enable me to give at the same time such rules as may point out their most essential difference, and thus lead to the perfect understanding of the shell itself, even when the animals (which it should be the aim of all Conchologists to procure) are unfortunately wanting.

The formation of shells takes place by the deposition of successive layers of shelly matter, secreted from the surface of the mantle of the animals on the internal surface, and more especially on the circumference of the already formed part, so as gradually to increase its size and form in a more or less depressed or elongated *cone*.* The smallest and outermost of the layers, or that which is first formed, of this shelly cone, I call the *nucleus*; and the position of this part leads to the division of shells into two great groups; for when it is central, and the sides are alike, the cone, and consequently the shell is *symmetrical*; and it is not *symmetrical* when the nucleus is lateral and the side dissimilar. The *symmetrical shells* are either straight as in *Cleodora*, *recurved* as in *Emarginula*, *incurved* as in *Patella*, or *convolute*, that is twisted parallelly on the same axis, as in *Nautilus*. The *non-symmetrical shells* are more or less *spirally* twisted, or in other words obliquely revolving round an imaginary axis, called the *columella*: the shells in this case are called *spiral*, while the separate revolutions are termed *whorles* or *whirls*; the whole, except the last, being taken collectively as the *spire*. When, however, the spire has become flat, or nearly flat, so that the axis is very short, and the shelly cone (i. e. the whorles) very rapidly increase in size, the shells are termed *discoidal* or sub-convolute; the revolutions or whorles are rarely distinct from each other as in *Scalaria*, but are usually more or less compressed and soldered together, so that the conical appearance becomes less distinct; in this latter case their inner sides in revolving come together, either so closely as to form a solid *columella*, or are more or less distant and leave a space, which according to its size, is either a *perforation* or an *umbilicus*, or more properly a *hollow axis*. In some of the non-symmetrical shells, the shelly cone enlarges so rapidly, that room is scarcely left for it to become spiral, as in *Pileopsis*, *Bulla aperta*, *Aplysia*, and especially *Umbella*; but these may readily be distinguished from the symmetric shells.

The application of a new layer to the edge of the inner surface

* This latter word I use in its most extended signification, as a body which gradually increases in diameter, from its apex to its base, let it be round, compressed, or even angular; straight or oblique.

of the nucleus, usually leaves concentric striæ or laminæ on the surface; this sort of sculpture, whatever may be the position of the cone, should be called concentric, or perhaps in spiral shells transverse; in bivalve shells it is often called *antiquated*, a term which is not objectionable; but in the spiral univalves it has generally been considered as longitudinal, which is evidently improper. On the other hand, when the striæ, ribs, or plaits, radiate from the nucleus, and are continued across the concentric striæ, instead of being called transverse, the term usually employed, they ought to be called *radiate*, *longitudinal*, or *spiral*, according to the form which the cone assumes: from this deposition of shelly matter from the edge of the mantle, all the remarkable modifications of the surface, as spires, tubercles, folds, foliations, digitations, and branchy expansions take place; they are formed on the margin left by the successive increase at the edge of the aperture; when they are the remains of the thickened and reflected lips, they are called *varices*, from their resemblance to veins distended with blood.

The cavity of the shells, which varies according to the length of the cones, is usually continuous; but in some shells, owing to the shortness of the body, the apex of the mantle forms one or more shelly diaphragms, and then the shell is called *chambered*; these chambers generally remain attached to the shell, but sometimes the upper ones fall off, when the shell is termed *decollated* or *truncated*.

I have before stated that the nucleus is the outermost and first formed plate of the shell, it is consequently generally the apex; therefore the aperture, which is last formed, must be the base; let the cone be twisted how it may, this aperture is usually and properly divided into right and left lip, according to the side of the animal to which it is next; and in the spiral or convolute shells it is divided into the labium or columeliar lip, and the labrum, or outer or marginal lip.

§ 2. *On the Natural position of Shells.*

The greatest confusion has existed with respect to the natural position of shells, which has unfortunately led to an indiscrimi-

nate application of terms, of quite contrary signification, to the same portions of the same shell. The part where the head of the animal is situated, has thus been called the back, the base, and the front; a contradiction in terms arising entirely from a culpable inattention to the natural position of the animal, from which alone that of the shells can be correctly pointed out.

In the *symmetrical* conical univalves, the front of the shell, or that part over the head of the animal, is known by attending to the fork of the muscular impression, the prongs of which are directed forwards. The position of the apex or nucleus can not be relied on for this purpose, as it is sometimes anterior, as in *Patella*, and sometimes posterior as in *Emarginula*.*

In the *symmetrical convolute univalves*, the front is in the centre of the outer lip, that is to say on the opposite side from the volutions; while in the *spiral univalves*, the front is always at that part of the aperture, which is most distant from the apex of the spire, or, in other words, at the base of the columella. That part of the aperture next to the spire is consequently the back; the inner, or columellar lip is the left side, and the outer, or marginal lip, is the right side in all *dextral shells*; the two latter being reversed in all *sinistral ones*.

The difficulties attending on the determination of the natural position of the bivalve shells, have generally been considered as much greater than those connected with the univalves, and hence the contradictory application of terms has been in them more frequent. It is indeed impossible to understand the description of a bivalve shell, without taking into consideration the particular views of the author whose works we are engaged in consulting; Lamarck, for instance, generally terming that the front of a shell, which should be called the back, and *vice versa*. Applying to these however the principle, that the mouth, or at least the entrance to the digestive canal, is always to be regarded as the front of the animal, and consequently of the shell, these difficulties will be found to vanish, and a satisfactory arrangement of nomenclature will be readily formed.

In the *true bivalves*, which are composed of two non-symmetri-

* Which reason induces me to refer *Patella Cochlea* to the *Fissurellada*.

cal, somewhat spiral cones, the entrance to the digestive canal is always placed on the side opposite to the ligament, which is consequently the front of the shell. The ligament on the other hand, corresponds to the back of the animal, and is therefore the dorsal side of the shell; while the side opposite to the apices or umbones, or that on which the valves open, is the basal; for here the animal protrudes its organ of locomotion, if it be provided with one, and on this it crawls as on a base, and not on the other or dorsal line, as I have heard some distinguished Conchologists assert, who attempt, by this means, to explain the eroded appearance of the apices of some of the fresh water species. As well might they, in fact, attempt also to prove on the same ground that the fresh-water spiral univalves crawl on their tips. On the same principle of constantly referring to the animal in the description of the shell, the margin of these bivalves will be divided into the anterior, or, according to the excellent nomenclature recommended by Dr. Barclay, the oral part; the basal, or pedal; the posterior, or siphonal; and the dorsal, or cardinal, parts: the intermediate spaces being designated by a compound of these terms, as the anterior dorsal, the anterior basal, &c. When the anterior dorsal part is impressed, I use the term *lunule* to designate the depression; and when the same circumstance occurs on the posterior dorsal part, I apply to it the name of *escutcheon*; when the centre of this again is impressed, Lamarck calls the depression the *corselet*; these terms are not novel, and are, at least, free from the objections which attach to the older ones. Thus when a bivalve shell is placed on its basal margin, with the ligament towards the observer, the right and left valve will correspond with his own sides.

The *brachiopodous bivalves*, as the Terebratulæ and Lingulæ, differ essentially from the true bivalves in their shells being symmetrical, or in other words formed of two symmetrical cones, as well as in the different position which the animal assumes, a position to which the Ostreæ and Anomiæ most nearly approach. The shell of the *brachiopodous bivalves* is attached by its posterior part, which is marked both by the hinge, and by the gap or perforation for the passage of the tendinous attachment: the opposite end to this, is of course, the front of the shell. The perforated

valve is the *upper or dorsal* one, while the other is the *lower or ventral*; this last being usually furnished with an *appendage*, assuming various forms in different species, for the support of the parts of the body of the animal. When the shell is placed on the lower valve with the hole or gap towards the observer, the sides of the shell will consequently correspond with his own.

§ 3. On the Measuring of Shells.

Connected as a correct idea of the dimensions of a shell necessarily is with a just view of its position, it cannot be wondered at, that confused notions on the latter subject should have led to errors in the former; and hence in the same manner as the back of a shell has frequently been termed the front, the length has been called the breadth, and *vice versa*. Some authors, indeed, have even gone beyond this, and have introduced a still more fertile source of error, by measuring one way in one shell, and another way in another; thus in one and the same work, describing that diameter as the breadth of one shell, which they assume to be the length of another. This inconvenience will be most securely avoided, by considering as the *length*, the interval existing between the head and the tail, or that part of the body, which, dividing it longitudinally, is most distant from the head: the *breadth* being the distance from side to side; and the *depth* being the space intervening between the dorsal and ventral sides. Thus, in measuring * the *symmetrical conical univalves*, the length will be from the front to the back of the shell, the breadth from side to side, and the depth from the base to the apex of the cone. In the *spiral univalves*, the length will be estimated from the back of the aperture to the front, and the breadth across the broadest part from side to side, at right angles with the mouth; the *axis* of the shell being measured from the apex of the spire to the

* A pair of callipers, such as are used by turners and gunners, (or I have lately had a pair made to fold up for the pocket), will be found the most convenient instrument for this purpose; the measurement being read off in parts of an inch in shells below a moderate size; for which purpose, I have a quadrangular rule, whose sides are divided into 8, 10, and 12ths of inches, and the French millimetres.

front of the columellar edge of the aperture. In the *True Bivalves*, the length is from the anterior to the posterior margin, the depth from the cardinal or dorsal to the basal or ventral edge, and the breadth from the most convex part of the disk of one of the valves to the same part of the other. In the *Brachiopodous Bivalves* the length is taken from the hole, or gaping end of the shell, to the opposite margin; the breadth is from side to side of the edge of the valves, at right angles with the length; and the depth is from the most convex part of one of the valves to the opposite part in the other. And although this mode of measurement will appear, when the shell alone is considered, exactly the reverse of that recommended for the other bivalves, yet with reference to the animal, it will be found perfectly to accord with the principles I have previously attempted to explain.

§ 4. *On the Muscular Impressions of Bivalves.*

Lamarck has used the character offered by the impressions left by the attachment of the adductor ligament and muscles of these shells, to separate them into two groups, calling the one *Dimyares*, and the other *Monomyares*, as if there were a difference in the number of the muscles; but there are always two, which only vary in position and size; thus in the latter, the posterior one is larger and more in the centre of the shell than in the former; but if the anterior part of the cavity be examined, the other will be found of a larger or smaller size, according as the species approaches or recedes from the type of these groups, which are very natural, though like most others that have a significant name, they do not agree with it in a literal signification. There are also two other muscular impressions, close and sometimes confluent with the former, which support the body and foot of the animals; but there are besides these, which have hitherto only been taken notice of by conchologists, two others which give great assistance in the natural arrangement of this difficult class. I allude to the *submarginal impression*, or that by which the beard or mantle is attached to the shell, and the hinder impression of the adductor muscle of the syphon, which I propose to call the *syphonal scar*. The presence or absence of this latter impression, at once points

out the presence or absence of this organ, which is so important in the habits of the animal, and if present, shews by the distance which it extends towards the anterior part of the shell, the length of the tubes. These characters certainly afford great advantages to a conchologist, in as much as they enable him to understand the habits of the inhabitant by the mere inspection of the shell.

§ 5. On the Operculum.

The aperture of many of the spiral univalve shells is more or less completely closed, when the animal has retreated within its habitation, by a shelly or horny substance, which is denominated the *Operculum*; and which is attached to the back of the hinder end of the foot of the Ctenobranchous, and some of the Pneumobranchous Mollusca, by which the shells are formed. It closes the mouth by the contraction of the hinder portion of the muscle that is attached to the columella, the anterior portion of which retracts the head, and the hinder part being longest, the head is first enclosed. Little attention has hitherto been paid to the structure of this part, which has generally been regarded only with reference to its presence or absence, as a mark of generic difference; but as the nature of its structure and its consistence will be found capable of assisting greatly in the arrangement of such of the Mollusca as are provided with it, I shall briefly offer a few remarks on its formation. The opercula are formed in the same manner as shells themselves*, by the deposition of successive layers on the internal surface of their margins; and are divided by the manner in which these layers are deposited (as exhibited by their concentric striæ, or striæ of growth) into two groups. In the first of these groups, or the *Annular Opercula*, which are analogous to the symmetrical shells, the nucleus is more or less central, and the increase is by the deposition of new matter on the whole edge, thus exhibiting ring-like concentric striæ. The most distinct type of this formation is where the nucleus is nearly central, as in the Paludinæ, where the Operculum is horny; and in

* This is peculiar as being a shelly part, not formed on the mantle, but secreted by a peculiar apparatus, which renders it not impossible that Hipponix should belong to the Cochleophorous and not to the Brachiopodous Mollusca.

the Ampullariæ, where it is shelly. In the Zoophagous Ctenobranchia, or the channel-mouthed spiral shells, the nucleus of the Operculum (which in these is always horny,) is near one end, but the annular structure still continues to be exhibited. In some few of these, the nucleus, which is near the point, begins to be slightly incurved, thus leading on to the other group, or the *Spiral Opercula* which are analogous to the spiral shells, increasing like them by the deposition of the new matter on the edge of the last whorle. This sort of *Operculum* is common to all the Phytophagous Ctenobranchia, or the entire-mouthed spiral shells, as the Turbinidæ, Cerithiadæ, Melaniæ; and the Cyclostomadæ. The *Operculum* is commonly attached to the animal alone; but sometimes, as in Neritina, it is articulated to the columella. It varies also in its substance, which is either horny or shelly; in the number of its whorles; and in its size with regard to the mouth; and these variations afford much assistance in the formation of natural groups.

The Opercula are used medicinally on the continent, and were used by our physicians, for they are contained in the old Pharmacopœias. The true *Blatta Byzantina*, or Sweet hoof, is the Operculum of the Pteroceras, which somewhat resembles the claw of an animal. The false *Umbilicus Marinus*, or Sea navel (for the Acetabularia is the true,) is the large shelly operculum of a Turbo; and the small shelly ones are used at present in the Island of Guernsey under the name of *eye-stones*, to be placed on the eyes of persons who have sand or gravel in their eyes, for the purpose, as they say, of travelling round the eye and bringing the sand out; but in fact they only separate the lid from the eye, and thus allow it to clear itself by its continued motion.

§ 6. *On the Clausium.*

Of all the wonderful contrivances employed by nature for the protection of these animals, there is none which is more calculated to excite the admiration of the Conchologist than the *Clausium*, an elastic appendage which closes the aperture of the *Clausilia*, a genus of land Mollusca. It consists of a spirally twisted, thin, shelly plate, inclosed in the last whorle of the shell, and attached to the columella by an elastic pedicle. When the animal is re-

tracted within its shell, this plate nearly covers the aperture at a little distance within the mouth, and coming in contact with a transverse plait on the outer lip, leaves only a small canal formed between the outer plait and the posterior angle of the mouth, and sometimes an elongated longitudinal plait on the inner lip. When the animal wishes to protrude itself, it pushes the plate on one side into a groove situated between the inner plait and the columella, where it is detained by the pressure of the body of the animal, leaving the aperture free, and when the animal withdraws itself, the plate springs forward by the elasticity of its pedicle, and closes the aperture. This curious structure, and also the plaits of the mouth, which are intimately connected with it, are not formed until the animal has nearly reached maturity. It is best exhibited by breaking off the outer part of the aperture to the distance of about half a whorle, when it will generally be found free; but in order to exhibit it behind the columella in its natural position, when the animal is exerted, it is necessary to kill the animal in that situation, and then suffer it to dry before the outer lip is broken off, and the pedicle will thus become fastened to the side by means of the dried mucus; it may, however, at any time be relaxed by a little moisture, when it will instantly resume its elasticity, and spring from its concealment.

This part was, I believe, first described* by the accurate Otho Frederic Muller, in his excellent *Historia Vermium &c.* in 1773, and by him called *Ossicula* and *Scala*. He beautifully and accurately describes its peculiar function. Draparnaud has since described it as a new discovery, although well acquainted with Muller's work, which he quotes frequently; he does not, however, seem to have been aware of its use. Cuvier also, in his "*Regne Animal*," avows his ignorance of its use. In the *Annals of Philosophy* for 1822, there is a very good description of its mechanism, by Mr. Miller of Bristol, but that gentleman also appears not to have seen Muller's description, as he wishes to take to himself the credit of the discovery both of the *Clausium* and its use, for having shewn it to Dr. Leach in 1814 previous to the publication of Draparnaud's work.

* It had been before mentioned by Daubenton in his *Distribution methodique des Coquillages*, in the *Memoires de l'Academie des Sciences*.

§ 7. *On the Epiphragma.*

The *Epiphragma* is a membranous or chalky substance secreted by the animal, and closing the aperture of the shell in winter, and in very dry weather during the summer. It is peculiar to the land shells, or *Pulmoniferous Mollusca*, with retractile tentacula and pedicled eyes. As soon as the animal becomes sensible of the approach of either cold or drought, but more especially of the former, he retreats within his shell and secretes a quantity of mucus-like substance, which gradually becomes harder and covers the outer extremity of the retracted body. It has generally a small triangular mark over the aperture near the hole in the edge of the mantle, which conducts the air into the respiratory cavity. Sometimes, as in the *Helix Pomatia*, *candidissima*, &c. the whole of the *Epiphragma* becomes shelly; in this case the animal forms a second membranous covering, more internally, at some little distance from that first formed, and exactly similar to the external covering of the other species. On the approach of warm and damp weather the animal secretes a small quantity of mucus, which loosens the adhesion which had taken place between the *Epiphragma* and the sides of the aperture, and the former is thrown off by the pressure of the animal's foot. When another is required, the whole process is commenced anew.

Various names have at different times been given to this part. The ancient authors called it Πῶμα, Κάλυμμα, and Ἐπικάλυμμα. Thus Dioscorides called the *Helix naticoides*, which is remarkable on account of its large convex lid, Παμάτια; and Gesner, for a similar reason, gave the name *Pomatia* to the shell which we now call *Helix Pomatia*, which has been whimsically translated into *Apple* or *Orchard Snail*. Lister, with his characteristic accuracy, designated it as *Operculum salivæ confectum*, and Muller distinguishes it from the true opercula by the name of *Operculum hybernium*. Draparnaud, according to the French custom, has given it the new but very expressive name of *Epiphragma*; and Montague the inaccurate one of *Hybernaculum*. I was inclined to adopt the former of the above names, but Dr. Goodall informs me that it was used also for the true operculum,

which from the resemblance of the horny ones to claws of animals, was usually called by the Greeks Ὀνυξ, Βλάττον, and by Pliny *Cavum*. I have therefore for the present, at least, kept the name of Draparnaud.

§ 8. *On the formation of chambered and decollated Shells.*

The chambered shells, as the Nautili, seem evidently to be formed on the same principle as other shells; and the chambers are added after the formation of the shell, for the purpose of holding the straight body of the animal; the siphon being only a shelly tube formed by an appendage at the end of the body. The cause of the formation of the chambers appears to be, that as the animal enlarges, the shell, which is inelastic, must consequently be too small for it; it therefore gradually lengthens and enlarges the cone of the shell, and the body, which does not so much increase in length as in diameter, becomes too short for the cavity of the shell, and would consequently leave a space behind it, which is not consistent with the usual economy of the Mollusca. This space is therefore obliterated by a secretion from the base of the mantle. But as filling up the whole with shelly matter would occasion the animal to drag after it much useless weight, and thus prevent its floating, it is therefore closed by a shelly diaphragm, leaving the space behind filled with air, which from its lightness assists the economy of these curious animals, by enabling them to float with greater ease. A similar peculiarity takes place in several of the Turritellæ, and other shells where the spiral cone is very long and slowly enlarges; while in many shells the part beyond the diaphragm falls off, and they by that means become truncated or decollated, as in the *Helix decollata*, *H. purpurea*, the *Melaniæ*, *Cerithia*, &c. &c.

§ 9. *On the “ Epidermis” of Shells.*

The external surface of shells is generally covered with a kind of web, that has been usually, from a fancied analogy to the cuticle of the body, or the epidermis of plants, been called *Epidermis*. Lamarck observing the error of the name, which carried with it

a peculiar theoretical doctrine, that the shell was similar to the Rete Mucosum of animals, instead of being analogous to the hair, nails, and other appendages of the skin, proposed the name of *Drap Marine* ; but as this web is found in land and fresh-water shells, as well as in marine ones, this name is evidently worse than the former. Now although I allow that the shells of these various stations, have their peculiar kind of epidermis, I cannot think that it would be well to give three names to the same sort of covering ; to obviate this difficulty, I propose to call this web *Periostraca*, a name formed after that of the membrane which invests the bones of quadrupeds, which is called *Periosteum*, and which surrounds the bone as the *Periostraca* surrounds the shell. This name carries with it no theoretical view.

In my observations on the formation of shells, I stated that they were formed by a successive deposition of layers of shelly matter ; now each of these layers consists of a layer of animal matter, and a certain quantity of carbonate of lime, according to the structure of the shell ; these layers may mostly be traced by placing the shell in very dilute muriatic acid, so as very slowly to dissolve the calcareous matter, when the animal matter will be left in the form of plates, giving in fact the skeleton of the animal fabric of the shell. The same circumstance may be shewn by exposing the shell to the influence of fire, when the animal matter is destroyed, and the calcareous alone left ; but if this latter process is not carried to too great an extent, the plates of animal matter may be seen charred, forming black lines in the white chalky matter, if the shell is broken transversely.

Now from attentive examination I am inclined to believe, that the *Periostraca* is formed by the outer edges of the plates of animal matter, [which has no cretaceous matter deposited in it, or only a very small quantity,] being soldered together and forming a kind of external coat. I am more inclined to this opinion from the well known fact, that the innermost part of each of the plates of shelly matter, is much the most solid, and contains the greatest portion of earthy matter ; from this it is often called, when reflected over the back of the shell, as in the *Cyprææ*, the Porcellaneous coat ; and we find as we come toward the outer

edge, there is less and less of this latter substance deposited, so that at the end the plates are only formed of the animal matter. Now as these plates are deposited in a semi-fluid state, why should not their edges be soldered together, and form this external coat; for we find that it is formed of concentric striæ, similar to the striæ of growth, and that it separates more readily at these striæ than elsewhere?

This substance is formed at the external part of most shells, but varies very much in outward appearance; it thus offers very good characters for the distinction of Families; being sometimes very thick, as in the *Unionidæ*, at others very thin; and sometimes, as in the *Cyprææ*, being covered by the reflexion of the inner surface of the shell over it. The *Olivæ*, *Marginellæ*, &c. appear to be destitute of it altogether, as well as those few shells that are constantly covered by the lobes of the mantle being soldered over them. This Epidermis is formed on the external part of the *shelly operculum*, and we may perhaps say that the *horny opercula* are entirely formed of the same kind of substance as the *Periostraca*.

§ 10. On the “Ligament” of Bivalves.

Perhaps there is no part of the shell which has been so much misunderstood as the ligament; some have considered it as posterior, others as anterior; and some, as Lamarck and Burrows, sometimes on one side and sometimes on the other; some have made it dorsal and others ventral. But the position is not the only source of error, for its functions and structure have been equally misunderstood; thus most persons have evidently considered it as an homogeneous substance. Lamarck partly (though unconsciously), corrected this error, but he did not arrive at the truth, for he divided his *Mastracés* into those that have only an internal, and those which have an external and internal ligament; but I do not know what he could correctly place in the former section, for the shells which he refers to it, have as distinctly an external ligament as the others. He committed however a still greater error respecting the functions of this

part; for he observes, that "If the ligament be external it is *extended* when the shell is shut, and if the muscle, which keeps the valve close, be relaxed, the mere elasticity of the ligament opens them. If on the contrary, the ligament be internal, it is compressed when the shell is shut, but on the muscle which keeps it so relaxing, the elasticity of the compressed ligament serves to open it." How far different is the fact!

That part which is generally considered as the ligament is always formed of two very distinct substances, one of which is always external, is somewhat analogous to the ligaments which connect the bones of Vertebrata, and is like them quite inelastic; it appears to be of the same substance as the periostraca, and is attached to the outer upper margin of the shell. In some shells it is very thick and distinct, in others it is very thin and scarcely visible. In the Pholadæ it appears to be thin, and to have the shelly plates imbedded in its substance; this substance I am inclined to call the *ligament*.

The other substance which has been confounded with the former, is somewhat similar to the *cartilage* of the Vertebrata; it is eminently elastic and formed of parallel series of condensed transverse fibres, which are directed from the hinge of one valve to the similar part of the other. This substance is always situated within the other or true ligament, sometimes quite close to it and similar to it in form, in which case it is attached just below the edge of the ligament, to a protuberance on the dorsal margin of the shell; this protuberance is very distinct in the Tellinadæ and is sometimes called the *Callus*; but, as my friend Mr. James Sowerby observed, it may be better called, from its use, the *Fulcrum*. At other times it is placed at a distance from the ligament, in which case it is called *internal*, that is to say, it is enclosed in a cavity amongst the teeth, or in one peculiar to itself, as in *Myæ*. This cavity from its triangular shape and concentric striae, occasioned by the growth of the cartilage taking place at the internal margin, and thus increasing in breadth and thickness so as to form a triangular wedge, has been called by Lister, the *Cochleate* or *spoon-shaped cavity*. This body I call for the present the *cartilage*.

Now when the valves are brought together by the action of the

adductor muscles, the cartilage is always compressed, and when it is situated in a shelly cavity, all allow it to be so; and it is exactly the same when it is walled in by an inelastic ligament on one side, and pressed upon on the other by the callus; thus there is always the same endeavour to regain its situation and open the valves, let it be either external or internal. The only shells that appear to be deficient in this cartilage, are the *Myastrophæ* of my arrangement of *Mollusca*, where its place is supplied by an abductor muscle.

The *cartilage*, which is very peculiar for its black colour and pearly lustre, and for its great elasticity when fresh and moist, appears to be the nerve (*Nervus*) of Aldrovandus, when he is speaking of the Spondylus, and he appears to have had a very good idea of the use and structure of this part. When this substance is dry it is very brilliant, and has a fine display of colours; and I am informed that it is used by the jewellers for *black opal*, but it is apt to crack; by what name they call it I am not aware, which I much regret, as being of such a peculiar structure and use, it is worthy of a distinct appellation.

§ 11. *On the Opening and Closing of Bivalves.*

From what I remarked in the last observations, the valves of the bivalve shells must constantly have a tendency to be open or separate from one another; now, these valves are closed by the adductor muscles of the animal, which are generally considered as the only agents employed for the purpose of counteracting the elastic cartilage; but it is a well known fact that (voluntary) muscular action is only a periodical power, which requires rest by relaxation, before it can be called again into action, and that it would be very painful were it to be continually on the stretch, as any person may prove on himself by trying to keep the arm extended, or any part of the body confined in a particular position for a length of time. This effect is counteracted by a peculiar elastic ligament, similar to the *Paxwax*, *Whit Leather*, or *Ligamentum Nuchæ* of the herbivorous quadrupeds, which is formed for

a similar purpose, that of supporting the head without muscular power when the head is dependent for the purpose of grazing. This ligament is placed on the inner side, close to or partly attached to the adductor muscle, as may be observed by cutting the body usually so called across, when the two substances will be most distinctly visible, the one muscular, and the other eminently fibrous and pearly. Now this ligament allows the valves to separate to a certain distance, and no further. The natural position of the valves, when at rest, is separate from one another, as far as this ligament permits them to open, as every body who has observed the habit of the animals will allow ; but when any thing touches the animal, the adductor muscle is immediately put in action and the shells are closed ; but they can only remain closed, till the muscles are tired. That the valves are kept from separating beyond these limits by this elastic ligament is proved by the circumstance, that when the animal is dead, and the muscle is in a nearly decayed state, the valves are kept at this distance from each other, or when the muscular part is cut through, the valves do not exceed these limits ; but when the adductor ligament and the muscle are both cut through, the valves spring open to nearly as wide as they can without breaking the true ligament, unless where they are stopped by processes on the outside of the shell, as the beaks or the plates which cover the ligament, as in the *Cythereæ*.

This admirable structure was first pointed out by my friend Dr. Leach, who read a paper on it, and demonstrated the fact, before the Royal Academy of Paris ; much to their amusement, as being the first Englishman who had read a paper at their Academy, and I need not add, with his vivacity, that he did not disgrace his country. This discovery was noticed in the *Bulletin of Science*, for 1818 ; and Dr. Leach gave a short notice of it in the *Annals of Philosophy* for 1820, p. 111. but it appears that his view has not been clearly understood either by the English or the Continental Naturalists.

§ 12. On Reversed Shells.

The non-symmetrical shells are often what are usually called *reversed or sinistral shells*, that is, belonging to animals which have their organs of respiration placed on the right instead of the left side in the *Ctenobranchous*, and the aperture of the respiratory cavity on the left instead of the right, in the *Pneumonobranchous* Mollusca, so that they are somewhat analogous to left-handed persons of the human race; but they are much more seriously affected, for the whole of their viscera are equally reversed, as was pointed out by Lister, who wrote a very interesting paper on this subject.

In the shell of all these animals, the whorles of the spire, instead of turning and descending from the left to the right, turn the contrary way, that is from the right to the left, so that the shell if placed in its natural position, that is with its apex toward the observer, with its mouth downwards, will have the latter placed on the left side of the axis.

This kind of structure, which is mostly an accidental variety, is sometimes natural to a whole group of shells, when their whorles revolve, and their form is much more regular than when it is only a monstrosity, as is the case with the *Physæ*, *Planorbes*, *Clausiliæ*, &c. There are other species and groups where it is not uncommon to find some specimens, or species, in one way, and the others in the other, as in some *Pyrulæ*, *Achatinæ*, *Ampullariæ*, and *Helices*, whilst in other groups this is of very rare occurrence. This peculiarity has been generally considered as confined to the spiral univalves. But in my description of the shells in the Appendix to Capt. Parry's first Voyage, I first described it as found in the bivalves, which may be considered as formed of a dextral and sinistral univalve shell united together by their mouths. Since that time I have observed the same fact in several other species. There are two specimens of a new *Lucina*,* in the Tankerville collection, which, as pointed out by my friend Mr.

* I call this new shell *Lucina Childrinæ*; it is distinguished from all the other *Lucinæ* by being unequivalved, and approaching nearly in form to the *Cytherea exuleta*; there is also another specimen in the British Museum.

Children, most admirably illustrate this fact ; for the valves being unequally convex, if the two shells are placed on their most convex valves, their beaks turn towards each other, as the mouths of a reversed and regular spiral univalve would do if placed on their backs. This fact is most easy of discovery in the unequivalved shells, where it often takes place, but it can only be discovered in the equivalve ones, by an attentive examination of their teeth, when the number and position vary in the two valves ; in which case, as in the one above quoted, the teeth of the right valve will be on the left, and *vice versa*.

But here this curious circumstance, as in the univalves, often takes place naturally, more especially in the attached and inequivalved shells, which are sometimes attached by one, and sometimes by the other valve, to which Lamarck refers when he divides his *Chamæ* into those which have the beaks turned to the right, and those which have them turned to the left ; when the fact is, that they are only attached by the right or left valve ; but I have seen two specimens of the same species, which were under the same predicament as the two *Lucinæ Childrinæ*, and consequently one of these shells was truly reversed.

The symmetry of the two sides of the animal, and of the shell, precludes this variety from taking place in the other shells.

§ 13. *On the Structure of Peneroplis and Pollontes, of De Montfort.*

In my observations on the structure of the chambered shells, I attempted to explain the formation of the *Nautilus Pompilius*, *Spirula*, &c. ; but in all these the shell ends in a cavity, which is commenced by a concave diaphragm : but in some of the minute species there is no terminal cavity, as the shell ends by a convex diaphragm, which is usually perforated by a simple hole, a star, or a series of minute foramina ; and appears to be formed by a certain number of hollow cells, which are variously placed, sometimes spirally, as in *Peneroplis*, and at others irregularly, as in *Pollontes*, which Montague called *Serpula seminulum*. I do not know what

animals are inclosed in or inclose these shells, but I must beg of some of my friends who live on the sea side, to send me some in spirits, for I doubt their being similar to those which form the *Nautilus Spirula*, a kind of Cephalopode; although my friend Mr. J. Sowerby pointed out to me the affinity that exist between these shells and the bone of the cuttle-fish; perhaps Montague may not be very wrong in placing them with the Annelides.

[*To be continued.*]

ART. XXV. *Correction of the Characters of the Genus Bellerophon, established by De Montfort, in his Conchyliologie. By M. DEFANCE.**

SEVERAL species of fossil shells are found in the Eissel, a canton of the duchy of Juliers, in the environs of Chimay, a small town of the Pays Bas, and in Ireland, which Denys Montfort, and other authors have placed in the genus *Bellerophon*. This genus, is classed, in the *Conchyliologie systematique*, with the chambered univalve shells, and amongst other characters assigned to it by the author, has smooth septa perforated by a siphon.

Unfortunately, this naturalist, although possessed of remarkable talents, has nevertheless committed very numerous errors, both in his descriptions, and in the figures which he has published. One of these errors is the assertion that the shells of the genus *Bellerophon* are chambered. I possess two species of them, one of which belonged to De Montfort's collection, and perhaps served as the type for the description and figure which he has given at page 51 of the work quoted above. Having suspected that these shells, filled with calcareous spar, are monothalamous, I sawed one of them through, transversely, and found, in fact, that it is convolute, like the *Nautilus*, but that it has no septa; so that instead of belonging to the division of Polythalamous Cephalo-

* Translated from the original, in the *Annales des Sciences Naturelles*, vol. i. p. 264.

poda, this genus should be placed in that of the Monothalamous Cephalopoda, near the Argonautæ, whose characters, as given by M. Lamarck, cannot apply to it, since the shell of the latter is very thin, whilst that of the Bellerophontes is very thick, and instead of the double keel of the Argonautæ, we find in the middle of the back of the Bellerophontes a single keel, dividing the shell into two equal parts. The latter differ moreover from the former, in the whorles of the spire being very numerous, whereas the Argonautæ are curved, but not convolute, so that nearly the whole of the shell is perceptible, the summit of which is extraordinarily obtuse.

The Argonautæ and the Bullæ are the shells which the Bellerophontes appear to resemble most, but still differ from them so much, that it seems right to form the latter into a separate genus. In that case they may be described by the following characters : *Shell free, univalve, not chambered, spirally convolute, depressed, shuttle-shaped? (formant la navette)—the last whorle of the spire inclosing all the rest; aperture very oval, receiving, in the middle part, the back of the shell.*

ART. XXVI. *Description of a new species of Arachnides, of the Genus Epeira, of M. Walckenaer. By C. VAUTHIER*.*

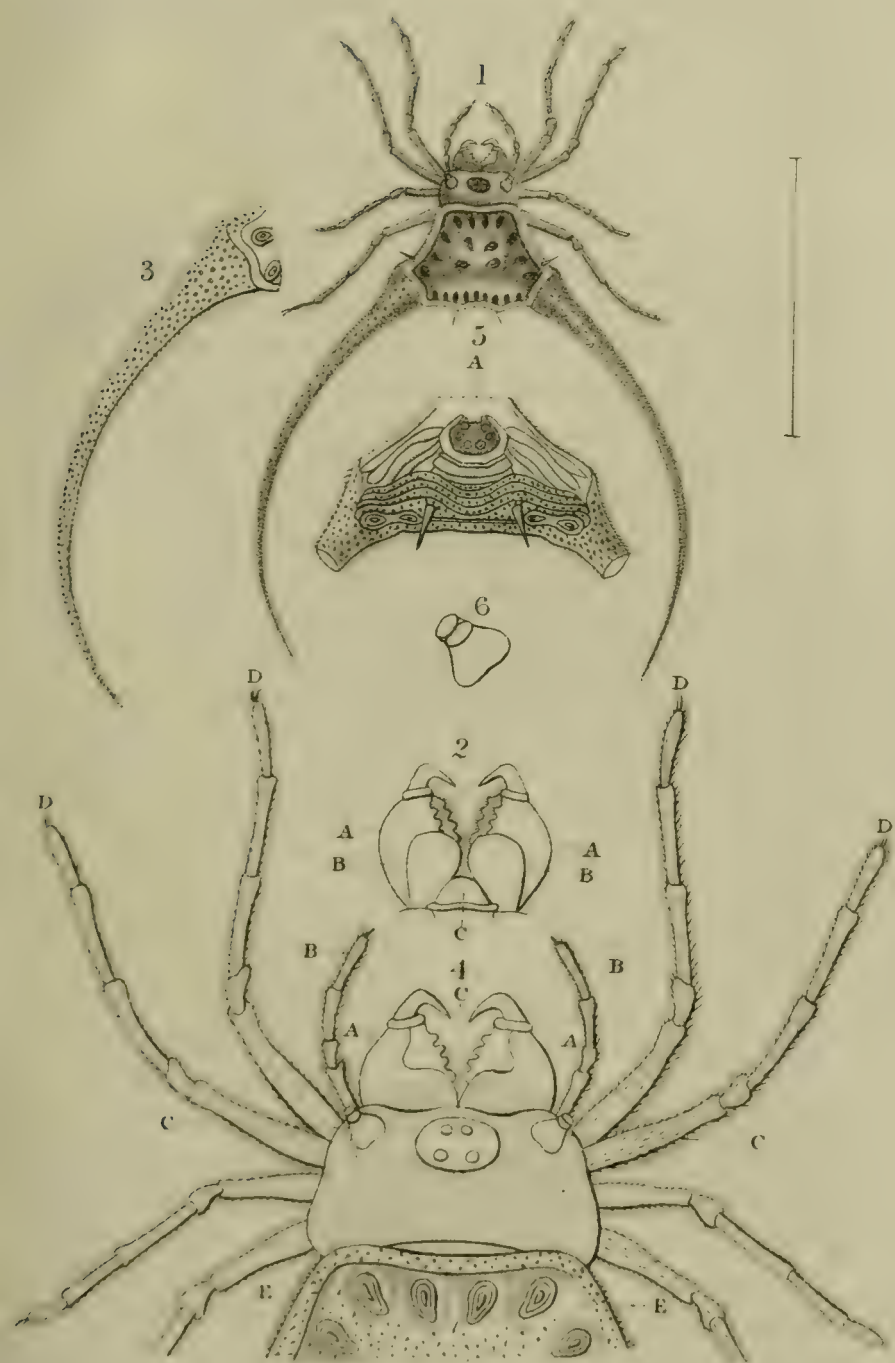
[With a Plate.]

THIS new species of Arachnides, originally from Java, which I shall describe under the name of *Epeira curvicauda*, was communicated to me by M. Léman. Its singular organization, and the perfect state in which it is preserved, have determined me to make an analytical drawing of it, and to publish its description.

Not having found in the collection of the Museum of Natural History, which I have carefully examined, nor in the authors whom I have consulted, any individual perfectly identical with

* Translated from the *Annales des Sciences Naturelles*, vol. i. p. 261.

Zoological Journal.



this, I have thought myself entitled to publish it as new, and thus enrich the genus *Epeira* with an additional species.

Epeira curvicauda.—VAUTHIER.

Description.—Body nearly triangular, fifteen lines long, from the terminal hook of the mandibles to the extremity of the abdominal processes (*cornes caudales*;) head furnished with two horny, black, smooth mandibles (*machoires*;) terminated by a scaly hook, of a clear brown colour, sinuated externally near the articulation; each mandible (*machoire*) armed with a double row of four unequal teeth, the last being the largest. The interval between the teeth is furnished with black, stiff hairs, which may be compared to eyelashes, pretty long, extending beyond the interior line of the mandibles, (*machoires*) and indiscriminately mingled together at the base, near the superior margin of the thorax. Two velvety palpi, of a dark brown colour, are attached to the sides of the maxillæ, (*machoires*) and composed of five articulations, the first of which is short, the second twice as long, the third curved, and shorter than the first; the two others are nearly of equal length, the last being terminated by a little black nail. Maxillæ (*lèvres*) brown, much shorter than the mandibles, (*machoires*), rounded anteriorly. *Labrum* (*menton*) brown, short, rounded at its anterior margin. Thorax black, very convex, twice as broad as long, nearly trapezoidal, with its anterior margin sinuated, slightly rounded at the sides, and completely bristled with pretty stiff white hairs; in the middle, and towards the anterior margin, are four smooth, very brilliant eyes, placed on a black projecting tubercle without hair; the two anterior eyes smallest and nearest together. On each side, at the same height, are two other tubercles of the same colour and still more elevated, at the extremity of each of which is a double eye. The legs are velvety, of a testaceous colour, eight in number, each composed of five articulations, the last of which is brown, terminated by a bifid hook of the same colour, and so small that it is almost confounded with the hairs that surround it. The first pair of legs

is the longest, the second pair next in point of length, the third much shorter, and the fourth pair as long as the second. Abdomen reddish yellow, triangular, its anterior angle truncated, slightly sinuated and attached to the thorax; each of the sinuated sides, has, at the posterior part, a small black spine, near which is attached a large rough horn-like process, furnished with blackish hairs, and curved inwards; its colour is brick red at the base, and blackish at the extremity; the posterior margin of the abdomen is slightly curved outwards; above this margin is a strong fold, at the extremities of which, situated in a cavity, are two black tubercular spots; on two eminences of the same fold, are attached two brown spines longer than those of the lateral parts, and extending beyond the margin. The abdomen is, besides, marginate all round, concave, with a rounded eminence in the middle: it has on the surface, twenty-three shining, black spots, of nearly an oval form, with a projecting margin, and a small raised tubercle in the centre. These spots are disposed as follows: four at the anterior part, three at each side, nine at the posterior margin, and four on the eminence in the middle; they very probably may be the stigmata which admit the air in respiration. The under part of the abdomen is shaded with brown, red and yellow, is plicate, and has a black projecting anus.

Explanation of the Figures in PLATE X.

Fig. 1. The insect magnified to twice the natural size.

Fig. 2. Parts of the mouth, viewed at the under side. A. mandibles. B. maxillæ (*lèvres*). C. labrum (*menton*).

Fig. 3. One of the abdominal processes, very much magnified.

Fig. 4. Mandibles, palpi, thorax, feet, and anterior part of the abdomen, highly magnified, viewed at the upper side. A. mandibles. B. palpi. C. tubercles which support the eyes. D. legs. E. black spots of the abdomen.

Fig. 5. Posterior part of the abdomen very much magnified, viewed at the under side, shewing the fold which bears the two spines, and the two black spots, situated in its cavity. A. anus.



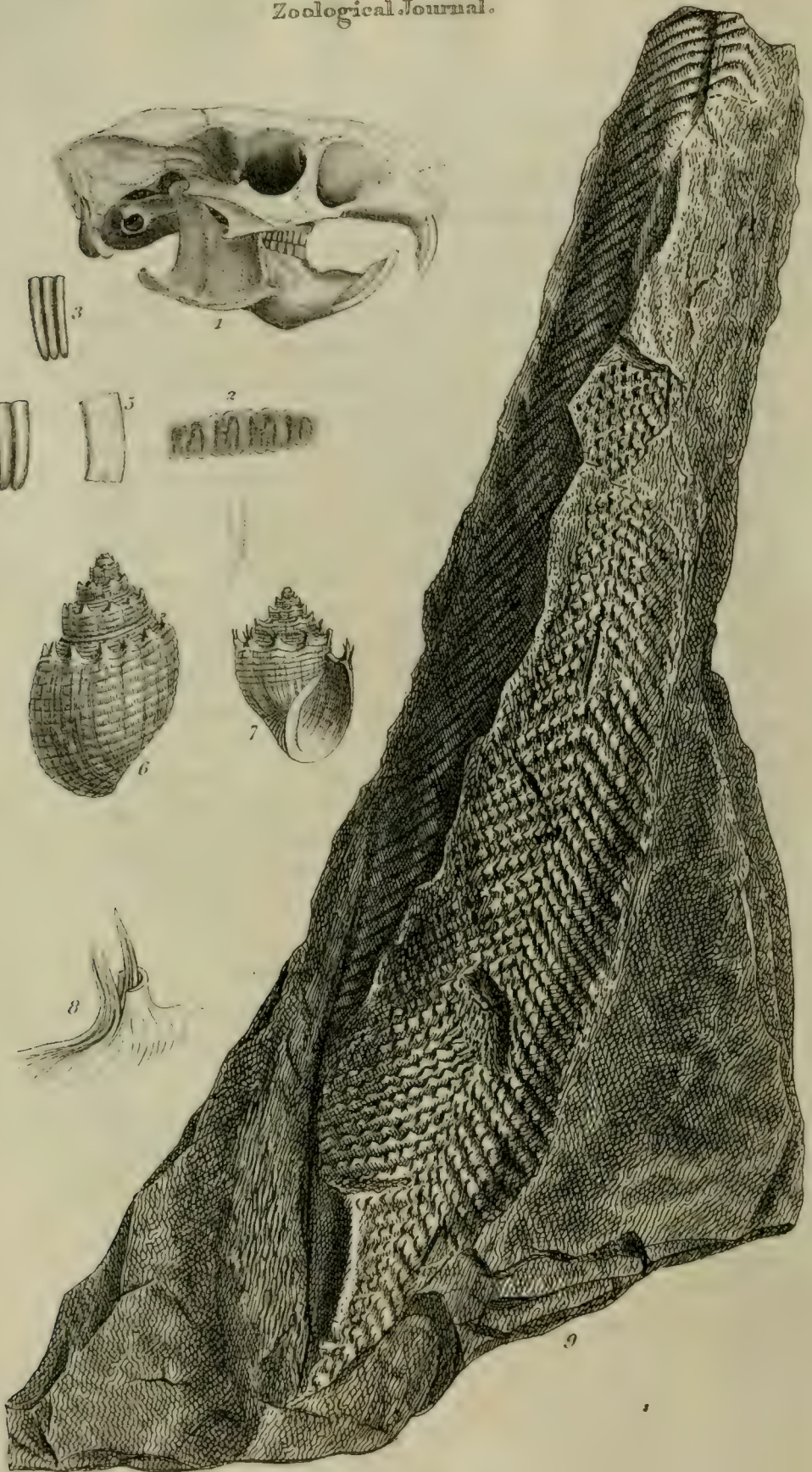




Fig. 1-5 *Sodon Ptilorides*. p. 227. Fig. 6-8. *Melania setosa*. p. 253.
Fig. 9. Fossil Bone. p. 252.



Fig. 6. One of the lateral tubercles of the thorax, highly magnified, which supports the double eye.

Note.—The author having used the term *machoire*, to signify sometimes *maxilla* and sometimes *mandible*, as also the words *lèvres*, when the *maxillæ*, and *menton*, when the *labrum* is obviously intended, the preceding alterations in the translation of his paper, are absolutely necessary.

ART. XXVII. *On a Quadruped belonging to the Order Rodentia.* By THOMAS SAY.*

IN the valuable collection of the Philadelphia Museum, there is the preserved skin of a mammiferous quadruped, exhibiting at first view the appearance of a gigantic rat, somewhat larger than a rabbit, and known in that institution by the name of *long-tailed Cavy*; a designation founded on the belief of its being either the *Chloromys acuchi*, or an undescribed analagous species.

It was brought to the museum more than twenty years ago, either from South America, or one of the West Indian Islands, and from that period to the present it has been open to the inspection of the curious.

More recently a living specimen of the same animal was presented to the museum, which afforded the proprietors an opportunity of becoming acquainted with the habits of the species in a state of domestication.

I shall, in the first place, state the characters of a new genus, which I have constructed for this animal, and afterwards note its difference from, and correspondence with, other genera, to which it seems allied.

ORDER.—RODENTIA. GENUS.—ISODON.

Artificial Character.

Clavicles perfect; molares sixteen, prismatic, not divided into radicles; toes divided.

* Extracted from a paper in the *Journal of the Academy of Natural Sciences of Philadelphia*; vol. ii. p. 330.

Natural Character.

Clavicles robust, perfect; *incisores* not narrowed at tip, but very obtusely rounded; their transverse section presents a triangular figure, of which the angles are rounded: *molares* sixteen, the two series in each jaw converge a little towards the front, and consist of four teeth in each series, prismatic, not divided at base into radicles; their crowns flat, and traversed equally from the base to the summit by laminae, which on the summit and base of the tooth terminate precisely alike, in zigzag lines, and are the effect of the sides of the tooth being folded inwards transversely and with but little obliquity; the inner angles of the folds attain or surpass the centre of the width of the grinding disk, and do not oppose, but pass between the angles of the opposite folds; each molar of the superior jaw has two folds on the exterior and one on the interior side, and of the inferior jaw there are two folds on the interior side, and only one on the exterior; the interstices are filled near the summit with a cortical substance, but at the base they are void; the form of the grinding surface of the molares is quadrate, that of the two intermediate ones of each series particularly; the anterior molares are a little oblong, those of the inferior jaw terminate before in an angle; the posterior tooth of each series is somewhat rounded behind; *fore feet* four-toed, with a small tubercle instead of a thumb; *hind feet* five-toed; the toes are all divided, and rest equally on the soil in walking.

Species.

1. *Pilorides*, colour black, intermixed with testaceous on the top of the head, back, sides, posteriors and outsides of the legs; the hair of these parts being pale cinereous at base, then deep black, then testaceous, the tip black; on the sides, particularly in the region of the shoulders, are a few remote hairs, which are white and somewhat thicker than the others; front, sides, and inferior portion of the head and of the neck, breast and line down the ab-

domen, gray; *ears* rather small, obtusely rounded at the tip; *vibrissæ* long, black gray at the base; a few black bristles above the eyes; *eyes* moderate; *anterior foot* with the intermediate toes longest, equal, exterior toe shortest, but nearly equal to the inner one; *thumb tubercle* small; *posterior feet*, with the three intermediate toes, subequal; the exterior and interior are rather shorter, and the latter shortest; *nails* robust, black; *tail* thick at base, gradually tapering to the tip, imbricated with scales, hair short, sparse, rigid.

As this animal exhibits the character of flat crowned teeth, altogether destitute of radicles, combined with robust and absolutely perfect clavicles, it is by the latter character at once excluded from Cuvier's second division of the Rodentia, which comprehends *Lepus*, *Lagomys*, and *Hystrix*, together with the several genera formed on the demolition of the Linneæan genus *Cavia*.

Of the two divisions, therefore, into which the Rodentia have been separated, from the consideration of the presence or absence of perfect clavicles, the new genus *Isodon* unquestionably belongs to the first, and may be grouped with *Arvicola*, *Fiber*,* and *Georchus*. It corresponds with the former, in the entire and prismatic form of the teeth. But in these genera each jaw is furnished but with six teeth, which is a smaller number by two than exist in our animal; and as this numerical character is undoubtedly essential, we are justified in regarding it as distinct from either. In numerical dentition, however, *Isodon* agrees with *Castor*, *Bathyergus*, and *Helamys*; but without resorting to a detail of other discrepancies, the manner in which the folds of enamel are arranged in its teeth, very sufficiently distinguishes it from either.

* Illiger enumerates four molares to each series in the jaw of *Fiber*; but, after ample examination, I agree with Daubenton and Cuvier, in asserting, that but three exist, of these, the grinding surface of the anterior one in the lower jaw is as long as the two others taken together, and is divided into nine triangular prisms, of which the anterior and posterior ones extend the whole width of the tooth, whilst the seven other prisms are smaller and alternate; in neither of the other molares, of either jaw, does the number of prisms exceed five. Each of these molares is certainly divided into two parts at base, though it is true these roots are not solid.

ART. XXVIII. *Note on the supposed Identity of the genus Isodon of Say, with Capromys.* By THOMAS BELL, Esq. F.L.S.

Soon after the appearance of Mons. Desmarest's paper on the genus *Capromys*, in the former number of this Journal, I received a letter from Mr. J. E. Gray, claiming the honour of the first description of that animal, for Mr. Say, the American naturalist, an abstract of whose paper precedes the present article. Mr. Say has given his animal the name of *Isodon pilorides*, but Mr. Gray very properly observes, that the generic name which Mons. Desmarest has given must be retained, as *Isodon* had been previously applied to another genus. On a very careful comparison of the two accounts, I am of opinion that the animals will prove not to be identical as to species, though they very probably belong to the same genus. It unfortunately happens that the description given by Mons. Desmarest, is wholly taken from external characters, as his specimens were both living,—whilst, on the other hand, Mr. Say's account is almost exclusively confined to the anatomical details. The differences however which appear, even from these imperfect descriptions, to exist between the two animals, are sufficient, I think, to warrant the opinion I have given, that they are distinct.

The animal named *Utia* (*Capromys* of Desmarest), is called by Bomare, “a species of Rabbit of the size of a rat;” and as this is the account of one who knew the animal in its native country, and speaks of it familiarly, there is no doubt that this is its usual full size. The *Isodon pilorides* of Say, on the contrary, is stated to be *larger than a rabbit*, being $19\frac{3}{4}$ inches in length from the nose to the insertion of the tail; whilst those in the possession of M. Desmarest were little more than a foot. The general colour of Mr. Say's animal is black, intermixed with testaceous; that of *Capromys* is a greenish-brown. In the details of the different parts of the body there are also considerable discrepancies with regard to colour. If, as Mr. Say assures us, his figure be accurate,

and that of Desmarest equally so, there would no longer be the slightest hesitation in considering them as distinct species. The general form,—the appearance of the hair,—the ears,—the nose,—the feet, &c. are considerably dissimilar; and the tail of *Capromys* is much more conical than that of the other. It must however be admitted, that until M. Desmarest gives us the anatomical details he has promised, we must remain uncertain as to the identity of these animals, neither of which appears to have been before described.*

ART. XXIX. *Memoir upon a new genus of Fossil Polyparia.* By M. LE SAUVAGE.†

AMONG the Fossil *Polyparia* found in the department of Calvados, for the knowledge of which we are indebted to the researches and labours of Messrs. De Magneville and Lamouroux, there exists a species which has been referred by the latter to the genus *Astrea*, under the name of *Astrea dendroidea*, (see Lamouroux, *Exposit. Meth. des genres de l'ordre des Polyptiers*, &c. Suppl. p. 85. pl. 78. f. 6.) M. Lamouroux has described this species from an irregular fragment of a few *centimetres* in height, and yet he has very judiciously observed that it was not encrusting, that it formed a mass of the same nature, and that it was distinguished by its form from all the species of the genus to which he referred it. In the Coralloid Limestone of the *Falaise* of Bénneviller, I have met with a large fragment of this fine Fossil, which is itself only a small portion of a mass several feet

* It appears by an article in the "Bulletin des Sciences" (1823, No. 7.) that Mons. Desmarest is himself of opinion, that these two animals are identical; though, from some degree of ambiguity in this passage, it is not quite clear whether he considers them as of the same species, or only as a species of the same genus.

† Translated from the *Memoires de la Société d'Histoire Naturelle de Paris*, vol. i. p. 241.

in height. It was therefore easy for me to observe that it afforded very decided characters, which M. Lamouroux could not observe in the fragment he possessed, and which separate it from the genus *Astrea*.

This singular production is formed of a considerable bundle of branchy stems from 10 to 15 lines in diameter, *simply contiguous*, and presenting to view, from one end to the other, regular series of rounded dilatations and circular contractions. The branches are terminated in rounded points of unequal heights, and their entire surface is covered with lamellar, rounded, contiguous, and almost superficial stellæ. If the transverse section of one of the branches be examined, it will be seen that its interior is formed of numerous laminæ, with angular spaces between them, and that they affect the form of a star. The longitudinal section shows a series of cavities, sometimes regularly proportioned, which seem to indicate that the inside of the branches was chambered: but these cavities appear to be owing, at least in a great measure, to a sort of contraction, the result of a confused crystallization of the calcareous matter which entered originally into its composition. This calcareous matter is of a dull-reddish colour, which forms a contrast to the whiteness of that which encrusts the mass. Considering the fine preservation of so prodigious a Fossil Coral, we might be led to suppose that it has not undergone any displacement, but that it has been enveloped in the Limestone that surrounds it, in the place where it originally lived.

The disposition of its stellæ, spread over the whole exterior surface, separates it from the order of the *Astreæ*, thus characterized by M. Lamouroux: "*Etoiles ou cellules circonscrites, placées à la surface supérieure du Polypier.*" This single circumstance would prevent its being retained in the genus *Astrea*, which is placed in the order of the same name, even if it were not sufficiently distinguished from the species composing that genus, by its disposition in fasciculated branches. Its natural position is in the order of the *Madrepores*, thus defined: "*Etoiles,*" ou "*cellules circonscrites, répandues sur toutes les surfaces libres du Polypier,*" and it should be placed at the head of this order, before the genus *Porites*, from which it is well distinguished by





NYCTINOMUS BRAZILIENSIS.

Printed by C. Hullmandel

the even and rounded form of its stellæ, this latter having the laminæ of its stellæ “filamenteuses, acérées ou cuspidées.” *Lam. Anim. sans vert.* vol. ii. p. 267.

In consequence of these considerations, I have thought it convenient to constitute a new genus for this Madrepore, and I propose to give it the appellation of *Thamnasteria*, which signifies “a bush with close branches covered with stars.” The following are its characters:

THAMNASTERIA. Polyparium petrosum, ramosum; superficies ramorum stellis lamellosis, sessilibus, oblecta; lamellis linearibus, rotundatis.

And its specific characters will be

TH. *Lamourouxii*, fossilis, ramosa, fasciculata, dilatationibus et contractionibus circularibus, alternis; stellis rotundis, subplanis.

* * Upon this we have only to observe that the word *ramosa* ought not to have been given in the specific character, as it was already placed in the generic.—ED.

ART. XXX. *Memoir on an American Bat, a new Species belonging to the genus Nyctinomus. By M. ISIDORE GEOFFROY SAINT-HILAIRE.**

[Read before the Société d'Histoire Naturelle, at Paris, March 5th, 1824.]

THERE exists an opinion regarded as paradoxical by many naturalists, but which to others seems to bear the character of truth, and therefore to be very important, namely, that the animals of one continent belong to it exclusively and are never met with in the other. To appreciate the value of this opinion, accurately, we must necessarily make this distinction:—is it meant to be asserted, that animals of either of the two worlds cannot be united as species of the same genus with those of the other, or, is it merely pretended that the animals of the two worlds are specifically different?

* Translated from the *Annales des Sciences Naturelles*, for April, 1824.

The second question is easily answered ; who, in fact, doubts the importance of *characters derived from the country they inhabit*, in distinguishing species ? How many of our French animals are unknown in the countries nearest to us ? How many are found even only in one single province, to the exclusion of all the rest ? Where we see Nature varying in this manner, almost from field to field, how can we refuse to take into consideration the boundaries marked out by immense oceans ?

The first question presents a substantial difficulty ; perhaps we have not, even yet, sufficient data for its solution ; at least, the consideration of a fact so novel, and contrary to received opinions, as that which forms the object of this paper, would induce me to think so.

Buffon remarks * that the animals of one continent are wanting in the other, and that this holds good for all, those excepted which breed in the northern climates. He explains the exception by the contiguity of the two continents towards the north.

This observation, which Buffon applied only to animals considered in regard to species, may be extended also to genera, at least to those of the first families. Buffon, though he did not so express himself in his writings, doubtless was of that opinion, since he was bold enough, though he knew but a few species of Monkeys of either continent, to trace characters for the whole, founded on the differences which distinguish the American Monkeys from those of the old world. The discoveries of Naturalists, since Buffon, have confirmed what he advanced, so that his idea, bold and perhaps even rash originally, may now be considered as the fruit of an admirable perception of the relations of animated beings, and as the work of a genius which outstripped the knowledge of its own day.

It is very worthy of remark, and perhaps the fact may be explained by the greater attention which Zoologists have paid to the study of the animals most resembling man, and to the consequently more careful formation of the first genera ; it is very remarkable, I say, that in proportion as we descend in the scale of beings, the existence of animals common to both worlds be-

* *Animaux Communs aux deux Continens.* t. ix. p. 97, et suiv.

comes more frequent. Thus of all the genera of Simiæ, Lemures, Cheiroptera and Insectivora now known, there is not one, I may venture to affirm, whose existence in both continents is unquestionable. The first instance that we find of this simultaneous existence in the two worlds, is in the Carnivora, where we come to the Ursi, Feles, &c.

Amongst all the families formed of genera, always exclusively confined to one or other of the two continents, one of the most remarkable is that of the Cheiroptera. Formerly, as is well known, zoology included under one common denomination, all the known species of Bat, and it might then be accurately asserted that the genus *Vespertilio* inhabited every region and every part of the globe. But, when naturalists, guided by more attentive and scientific observations, discovered that the Bats, like the Monkeys, ought to be considered, not as a genus, but as a large family; when in short, the numerous species of Bat had been divided into natural genera, it is a curious fact, that all the new genera, properly natural, were found always to belong to only one of the two continents, to the exclusion of the other.

At present the genus *Vespertilio*, is the only one found in both worlds; but is it a natural genus? must not some subdivision be yet made in it? I shall not attempt the solution of the question, for it would lead me too far. I shall only observe that many celebrated zoologists have already proposed new subdivisions of this genus.

As to the genera *Roussette* (*Pteropus*, Briss.) and *Rhinopome*, (*Rhinopoma*), and M. Raffinesque's genus *Atalaphe*, (*Atalaphus*) which have been said to exist in both worlds, I shall observe that the pretended *Roussette* of America is, as has been proved, from India, and belongs to the species *Pteropus Leschenaultii*; and that the genus *Rhinopoma** is not a natural genus, for, although the two species that compose it, have some resemblances to each other, they are not such as to unite them into one genus.

* The genus *Rhinopome* was established by my father, who tells me that he intends to separate the species, hitherto called *Rhinopome de la Caroline*, from *Rhinopome microphylla* (*Vespertilio Micro Phyllus*. Schr.) the true type of the genus, and to place it elsewhere.

As to the genus *Atalaphus*, formed of species without any incisors it would be wholly anomalous, since it is a character of the Bat, to have all the three kinds of teeth, and thus never to want the incisors in both jaws at the same time; moreover the two species referred by M. Raffinesque to the genus *Atalaphus* appear to be *Vespertiliones*. In point of fact, the *Vespertiliones* sometimes lose their incisor teeth, as M. Desmarest has observed, and two individuals of that genus, so circumstanced, may, very probably, have been mistaken for new species. The celebrated d'Azzara, and other equally distinguished naturalists, have shewn us, by their own examples, that the most skilful observer is not always secure from similar errors.

Thus, up to the present time, whenever the existence of *Cheiroptera* of the same genus, common to both worlds, has been announced, examination has always shewn that the report of this simultaneous existence had no real foundation, and nature has been found invariable in her rule of not producing Bats, formed on the same type, in both the old and the new world.

What Naturalist, seeing this unchanging constancy, will refuse to admit as one of the characters of the family of the Bats, that of being distributed over both worlds, but formed of genera always confined to one or the other exclusively? Certainly no one can be taxed with rashness for drawing so natural an inference, an inference, however, which, justified by a multitude of probabilities, had not been so by a single positive proof, and which, consequently, a single discovery would be sufficient to overthrow.

Zoology is indebted to the celebrated traveller, M. Augustus Saint-Hilaire, for the means of verifying this fact, not less important for the consequences derived from it, than curious and remarkable in itself. This is one of the fruits of that admirable voyage already so important to the progress of Botany, and which might have been equally, or even more so, to the advancement of Zoology, if, as he has done with respect to his botanical labours, M. A. Saint-Hilaire had been himself the historian of his zoological discoveries. This celebrated traveller, as all the world knows, has lately explored Brazil, in which country he found the Bat which is the subject of the present article: I shall give

a succinct description of it, and shew that it belongs to the genus *Nyctinomus*, forming a very natural species of that genus, hitherto found only in the old world.

The genus *Nyctinomus* is allied, as is known, to the American genus *Molosse*, (*Dysopes. Ilig.*) The ears, the tail, the physiognomy, the proportions of the most visible parts, are almost the same in both genera; so that, when I first saw the new Bat from Brazil, struck with the circumstance of its being American, I took it, for the moment, for a *Molosse*; but soon perceiving that the feet were covered with long hair, the lips deeply wrinkled, and the membranes of the wings bordered with hair, a doubt arose in my mind, which was soon dissipated by examining the teeth; I compared them with those of a *Nyctinomus* from Bengal, brought from Pondicherry in 1818 by M. Leschenault, and I saw, with surprise, that not only their number, but, with the exception of the lower incisors, (which are bifurcate to the root, and very much crowded (*très entassés*) before one another in the Brazilian Bat, rather less so in the Asiatic,) their disposition and form was similar in both. The crania evidently belonged to species nearly allied; the only distinction between them, was that the cranium of the American Bat is a little wider, and not quite so long as that of the Bat from Asia.

All these characters leave no doubt that the new Bat must be referred to the genus *Nyctinomus*, nor that it makes a very natural species of that genus; what follows will confirm, I will even dare to assert, rigorously prove this.

The most remarkable circumstance connected with the new Bat, being the country it comes from, I shall give it the name of the *Nyctinome* of Brazil, *Nyctinomus Braziliensis*.

An objection, however, may be started in this place, which though it has little foundation in itself, acquires it by circumstance; I have spoken of a pretended American Roussette (*Pteropus*): this Roussette, did indeed come from America; but it had been carried thither from India. It may be asked, was not the new Bat also imported into America? Thanks to the zeal of the celebrated traveller, I am not only well assured, that it is absolutely and originally native in Brazil, but I can even add,

that it is dispersed over, and by no means rare in that country. In fact, M. A. Saint-Hilaire, has not brought one or two only, but eleven individuals of the species, with the respective localities of each. These important memoranda inform us, that seven of them were found in the missionary provinces, and the four others in the district of Curityba.

I may be thought too diffuse on these particulars, and slow in coming to the description of the new species; I must, however, observe that the principal object of my Memoir, is not the discovery of a new species of Bat, but rather the discovery of a species of *Nyctinomus* in America. For the rest, in comparing the *Nyctinomus* from Brazil with that from Bengal, I have already given part of its characters, I shall now continue the description, always taking care to remark its principal relations to the other *Nyctinomi*.

I shall take no notice of the labial wrinkles, and the other generic characters of the new Bat; to say that it is a *Nyctinomus*, is to say that it has them all. I shall only observe that its upper lip, which is notched like that of all the other *Nyctinomi*, is less deeply so than that of the *Nyctinomus* of Egypt, (*Vespertilio acetabulosus*. Herm. Obs. Zool. p. 19. *Vespertilio plicatus*. Buchanan); for the rest, this is another character common to it and the *Nyctinomus* of Bengal, to which it is nearly allied by the general assemblage of its relations. The *Nyctinomus* of Brazil, is, very nearly, of the same size, as the *Nyctinomi* of Egypt and Bengal. Its total length is very exactly 0.106 m. (4.173 inches, English); the length of its body, is 0.069 m. (2.716 English inches); that of the tail, 0.037 m. (1.456 English inches); and its length from the extremity of one wing to that of the other, 0.285 m. (11.22 English inches).

The hair, which is rather soft and thick, presents some varieties of colour; its base is always cinereous, with a shade of brown, varying from black-brown to yellow-brown. In general terms, we may say that the *Nyctinomus* of Brazil, is of a cinereous brown colour; its tint greyer and less deep towards the abdominal region, rather deeper towards the breast, and still deeper and browner on the back. The hair which covers the internal part of

the membrane of the wing, is of the same colour as that which covers the abdomen; a very few hairs are observable at the upper portion of the tail, included in the interfemoral membrane, and on the surrounding part of that membrane.

I have thought it right to make only one species of all these varieties; in fact, I find in the same, or in several individuals, the different intermediate shades, between yellow-brown and black-brown; so that I observe the yellow-brown Bat pass successively to a deeper tint, then to a still deeper, and ere long to black-brown. These different Bats which I refer to the same species, are moreover perfectly similar in point of size and form. It is well known besides, how much the colour of the Bat's skin is liable to vary according to its age, sex, the time of year, &c.

Omitting their generic characters, the ears are further remarkable for the folds or transverse wrinkles, which are found, perhaps less strongly marked, in the *Nyctinomus* of Bengal, but do not exist at all in that from Egypt. The ears of the first two, are somewhat less ample; the tail, of a moderate size, (its length I have given already) is surrounded at its upper half, and a little further, by the interfemoral membranes, a very narrow prolongation of which, accompanies it to about a third or fourth part of the lower half. I have not found any muscular band (*brides*) in this membrane, which is rather larger than that of the Bengal *Nyctinomus*. The membranes of the wings are shaped as in the Asiatic Bat, and most of the Molosses, and have not the singular form which prevails in those of the *Nyctinomus* of Egypt; they are rather wider in the Brazilian *Nyctinomus* than in its congeners, but they are shorter; the humerus is slender and short; the phalanges pretty long.

Such are the principal characters, which connect the new Brazilian Bat with the other *Nyctinomi*; and those which distinguish it from them. I think that I have sufficiently established, on the one hand, that the bat of M. A. Saint-Hilaire is a true *Nyctinomus*; on the other that it is a new species of that genus, which has hitherto been formed of bats of the old world exclusively. I have but one observation more to make. I have been careful, in the description, to point out how much the *Nyctinomi* of

Asia and America resemble each other in the form of the teeth and body, the disposition of the wings, and even in size ; it is the same also in regard to colour ; in a word every thing is so similar in the two, that the figure of one might almost be taken for the figure of the other, and if the two animals were inhabitants of the same region, one would be tempted to unite them in a single species.

How remarkable a fact, that all these similitudes and relations should exist between the individuals, and yet the countries which respectively produce them be separated by an almost infinite tract of ocean !

So striking a resemblance in point of form, and such intimate relations existing between animals whose native countries are so widely separated, might almost lead to the conclusion, that locality should be struck out from the list of distinctive characters. I am not however of that opinion. We must not forget, that the truth of the idea, which I have just proved erroneous, seemed demonstrated by the experience of ages, and consequently that the exceptions to the rule are very rare. Difference of country neither can, nor will any longer be a proof of difference of organization, but it can and must always be an indication of it : it can no longer prove it, but it ought always to make us suspect it ; in a word, it can no longer command, but it can always counsel, and thus the Naturalist, without blindly following the route it points out, ought carefully to collect its indications, that he may advance with firmer and surer step in the path he has thought fit to pursue. I will not conclude without reminding the Reader, that the establishment of the genus *Nyctinomus*, forms a part of my father's numerous labours on the Bats. This circumstance, however indifferent to the public, enhances the value of my *début* in the science, in my own estimation, since I am permitted to consider my present labour as a feeble branch, engrafted by myself, on the stem produced by my father.

Explanation of Plate XI.

Fig. 1.—*Nyctinomus Braziliensis*—back view.

Fig. 2.—Its Head—front view.

Fig. 3.—Head, seen in profile.

Fig. 4.—Side view of the Cranium.

Fig. 1, is reduced to two-thirds of the natural size.

Figures 2, 3, 4, are of the natural size.

ART. XXXI. *A Revision of the Family Equidæ.* By
Mr. JOHN EDWARD GRAY, M. G. S.

Having occasion lately to examine most of the species of this family, and being struck with the confusion that exists in the names of the species, part of which was introduced by Mr. Burchell, in his very interesting travels, I have been induced to send you a revision of it.

The older authors speak of the Horse, Mule, Onager, Ass and Zebra, the last of which, they generally describe as having the body (corpus) striped with black, brown, and white bands, three inches broad, but take no notice of the colour of its legs: but in Jonston's figure they are distinctly banded. They also describe, and Jonston figures several others, as the *Ethiopian Horse*, t. 3. which has very large canine teeth, the mane the whole length of the body, and the hoofs divided; it appears to be a painter's fancy. 2dly, The Indian Horse, which is banded like the Zebra, but has the mane and tail of a Horse; this is most probably only an erroneous representation of the Zebra; and 3rdly, the *Onager* with one horn; t. 6. and the *Onager* with two horns, and divided feet, the latter of which is most probably intended for the Two-horned Rhinoceros drawn from memory, and the former appears to be a fictitious animal altogether. Molina, in his History of China, speaks of the *Gnemel* or *Huemul*, the *Equus bisulcus* of Gmelin,

which, from his description, if it exists, is most probably a species of *Lama* (*Auchenia*.)

Edwards, in his Gleanings of Natural History, figured what he considered as the male and female Zebra, the former of which I consider to be the true Zebra, and the latter is perhaps the Quagga; but both the figures have the bands too pale, and indistinct, and the latter especially has some spots on the rump, which do not exist in the Quagga, and yet it has not the bands of the *Asinus Burchellii*.

Linneus, in his *Systema Naturæ*, described three species, the Horse, Ass, and Zebra, the latter of which he characterized, *E. fasciis fuscis versicolor*. Referring to the two figures of Edwards, and adding as a description *Color albidus seu rufescens, fasciis nigris digitos tres latis per totum corpus transversis, &c.*, I am not able to reconcile these two descriptions, but neither the Zebra nor the new species has the bands purely black, but very deep blackish brown: and Linneus certainly agreed with Edwards, in considering the two, that the latter author figured as sexes.

Pallas, in the nineteenth volume of the *New Commentaries of the Russian Academy*, adds another species, by the name of the *Equus Hiemionus*, which is called *Dshikketei* by the Tartars, and which Cuvier considers to be the Wild Mule of the ancients.

Capt. Gordon sent a species of this family, called Quagga, from the Cape to Amsterdam, where it was first described and figured from his drawing in the Dutch edition of Buffon, and afterwards in the Supplement to the French editions, whence it has been described by most Zoologists.

Burchell, in his *Travels*, has taken notice of a new species, which he has for some reason called *E. Zebra*, and which he says is confined to the flat parts of Africa, and the old Zebra under the name of *E. Montanus*, as this species is found only in mountainous parts.

Le Vaillant, in his curious *Travels*, has mentioned another species under the name of *L'ane Isabelle*, (vol. iii. page —) which he says is of a plain Isabella colour, without any band; but nobody since his time, as far as I can learn, has mentioned it: may it not be an albino variety of the Zebra, or Quagga? as the

Ass is sometimes found of yellowish white, without any cross, in its domesticated state. Mr. Cross informs me, that a year or two ago, a specimen said to be of this species was brought to this country.

This family (which is distinguished from all other animals by its undivided hoof, formed of the two anterior toes, soldered together, its simple stomach, and its female having the teat placed on the pubes,*) may be divided into two very distinct types of form; the one the Asses and Zebras, which are always whitish and more or less banded with blackish brown, and always have a distinct dorsal line, the tail only bristly at the end, and have warts only on the arms, and none on the hind legs; and the true Horses, which are not banded, have no dorsal line, are furnished with warts† on their arms and legs, and have long hair on the tail, from its insertion to its extremity.

Family EQUIDÆ.

Solidungulæ. Antiquorum, *Cuvier*, &c. Genus. *Equus* *Lin.*

Dentes Incisores, $\frac{6}{6}$ canini (mares) $\frac{1.1}{1.1}$ molares $\frac{6.6}{6.6} = 40$.

Pedes ungulâ indivisâ.

Genus I. *EQUUS.* The *Horse.*

Caudâ undique vetosâ, lineâ dorsali nullâ, verrucis brachiorum pedumque distinctis.

1. *E. Caballus*, the Common Horse.

E. infasciatus.

Equus Caballus. *Lin. Syst. Nat.* j. 100.

Equus Antiquorum. *Gesner, Quad.* 132.

Cheval. *Buff. Hist.* iv. 1.

Horse. *Bewick, Quad.* p. 1. Generous Horse. *Pennant.*

* Linneus observes that *mares mammas non habent*, which is not the fact, for he ought to have said *mares mammas prepucciales habent*.

† These were formerly used in medicine, and were enumerated with the drugs in the London Pharmacopœia till 1745, under the name of *Verrucæ pedum Equinorum*.—See Gray's Pharmacology, edit. 3. p. 161.

Icon. *Jonston, Quad.* t. 1, 2, 3, 4. *Buffon* iv. t. 1. *Shaw, Zool.* ii. t. 214, 215. *Bewick, Quad.* p. 1.

β. Sylvestris.

Wilde Pferde. *J. G. Gmelin H.* j. 221. ii. 510.

Takija, or Wild Horses. *Bell Trav.* j. 225.

Inhabits Tartary, but has been transported by Man to most of the other parts of the world, both of the old and new continent. *Mus. Brit.*

This species has very numerous varieties which are interesting to study, but very difficult to characterize, and Mr. Huzard is at present illustrating them with lithographic plates.

Genus II. ASINUS.

Caudâ apice setosâ, lineâ dorsali distinctâ, ornatâ, verrucis brachiorum distinctis, pedum nullis.

Sp. 1. *Asinus Hemionus.* The Dshikketei (Zikketei.)

A. fulvo-fuscus, jubâ, caudâ, lineâ dorsaliq.ue nigris.

Equus Hemionus. *Pallas, Nov. Comm. Petrop.* xix. 394.

Equus Hemionos. *Bodd.*

Hemionos. *Plin. Hist. Nat.* viii. c. 44.

Dshikketei. *Pennant, Quad.* 4. 2. *Yototse. Chinese. Dzigitshai. Buff. Sup.* vi. p. 37. *L'Dziggetai. Cuv. Regn. Anim.* j. 244. *L'Hemione. Ency. Method.*

Wild Mule, Half Ass or Fecund Mule. *Pennant, Quad.* Jickta. *Shaw*, ii. 427.

Icon. *Pallas. Nov. Comm.* 1. c. t. 7. *Neue Nord. Bctyr.* ii. t. 1. *Ency. Method.* t. 43. f. 4. copied.

Inhabits the Desert of Mangol, on the borders of China and Thibet. *Pallas.*

Description. Shape of the Mule, head and ears large; fur Isabella yellow, mane, tail, and dorsal line black, the hair of the winter coat very long; of the summer, short.

Sp. 2. *Asinus vulgaris.* The Ass.

A. cinereus, lineâ dorsali et transversali scapularum nigris.

Equus asinus. *Lin. Sys. Nat.* j. 101.

Equus asina. *Fleming, Phil. Zool.* ii.

Asinus Gesn. Quad. 40.

Ass. Bewick, Quad. 19. *L'Ane Buff. Hist. Nat.* iv. xi.

Icon. Jonston, Quad. t. 6. *Buffon, iv.* t. 11. *Ency. Method.* t. 14. f. 1, 2.

♂. *Sylvestris.* Major, auriculis brevioribus erectis.

Onager, Wild Ass, antiquorum. *Ray, Quad.* 6. 3.

Onagus. *Gesn. Quad.* 19.

Equus Onager. *Bris. Reg. Anim.* 104.

Wild Ass. *Bell, Trav.* j. 212. Koulan, or Wild Ass. *Pennant Quad.*

γ. *Albida.* Albida, non fasciata.

1. *Mulus.* ex Equâ et Asino. *Mulc. Bewick Quad.* 16.

Mulus. *Ray, Quad.* 64.

Icon. Jonston, Quad. t. 6. *Ency. Method.* t. 44. f. 3.

2. *Hinnus.* ex Asinâ et Equo.

Hinnus. *Ray, Quad.* 64.

3. *Fasciata.* ex Zebrâ et Asino.

Inhabits Tartary, in the wild state; but man has domesticated it to most parts of the world.

Description. Head and ears long. Fur gray, lower part whitish, with a black dorsal line, and a band across the scapulæ, end of the ears black.

The wild Asses, or Onagers, are larger, and the ears are shorter than the domestic variety, which varies in size and form according to the climate; the white variety is an albino, as the eyes are red. Their voice is called braying. The hybrid bred between the male Ass, and a mare is called a Mule; it has more the general form and size of the mare, with the large head, long ears, and nearly naked tail of the Ass. That bred between the Horse and the Ass is called a Hinny; this animal is generally of a smaller size than the Mule, and has a smaller head, shorter ears, and more hairy tail, but its form is like that of the Ass. Thirdly, that between the Zebra and a male Ass, is called the *Ribbon-legged Ass*; it is grayish, with black bands on the outer face of the legs, and has a black line across the shoulders, with the form of the Ass: all these varieties are barren, according to the accounts of authors.

Sp. 3. *Asinus Quagga*. The Quagga.

A. capite, nuchâ, scapulisque nigris albido-fasciatis, dorso fuscescente subfasciato, lineâ dorsali nigrâ albido-marginatâ, caudâ artubusque albidis.

Equus Quagga. Gmelin.

Le Cougga. Cuvier. *Reg. Anim.* 245.

Zebra fæmina, &c. Edw. *Glean.* j. 29?

Opeagha, or Quagga, of the Hottentots. Masson. *Trav. Phil. Trans.* lxi. 297.

Quacha. Pen. *Quad.* 14. Female Zebra. Edw. *Glean.* j. 29?
Le Couagga. G. Cuvier, *Menag.*

Icon. Edw. *Glean.* t. 223? bands too distinct, and no marks on the rump. Shaw. *Zool.* t. 218? copied Edw. G. Cuvier, *Menag.* t. — *Ency. Method. Suppl.* t. 13. f. 1. F. Cuvier. *Menag.* t. —

1. Junior. E, capite, et nuchâ, fuscis albido-fasciatis, corpore superne fusco, lineâ dorsali bruneâ notato, ventre artubusque albidis, ungulis nigris, supra annullis fuscis notatis.

Kwagga or Couagga. Buff. *Suppl.* vi. p. 85.

Icon. Buffon *Suppl.* vi. t. 7.

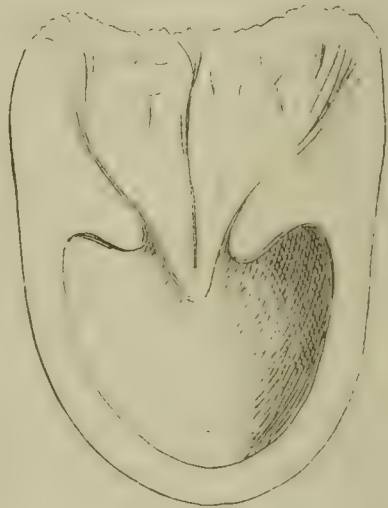
Inhabits Africa, near the Cape of Good Hope, v. v. Mus. Cross. 1. Mus. Brit.

Less than the Zebra, with the hinder parts higher, and the ears shorter. Fur of the head, neck, mane, and shoulders, blackish brown, banded with white, the ground colour gradually becoming paler, and the bands less distinct, and diffused as we proceed along the back till it is greyish on the rump; the dorsal line is black, margined on each side with a white line. Belly, tail, and legs white; ears with two irregular black bands and white tip.

The young is pale brown, with the mane, a few scattered spots, and the dorsal line of a deeper colour, the latter of which is slightly extended down the tail. The belly and legs whitish grey, with a dark ring just above the hoof. The forehead, cheeks, neck, and mane marked with narrow transverse whitish bands, which are visible in peculiar positions on the back also.

This animal lives in troops, never intermixing with the Zebras. According to Capt. Gordon, they are used by the natives for the purpose of draught; but as Buffon very justly observes, it is cu-

Zoological Journal.



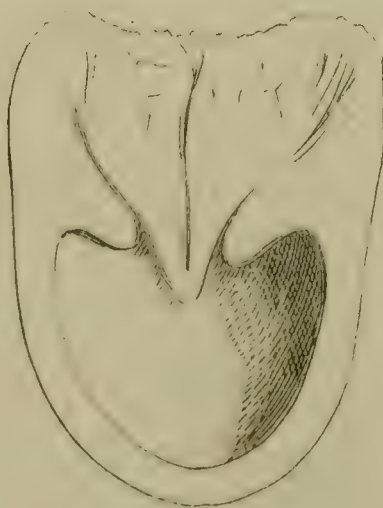


Fig. 1. *Asinus Burchelli*
2. Hoof of *ditto*.
3. " *Asinus zebra* } p. 247.

rious that he could only get a young specimen. The specimen at Exeter Change is not very docile, being much more wild than the Zebra; its name is derived from its voice, which resembles the barking of a dog.

When the skin of the animal, which I consider to be, and which agrees with Buffon's figure of the young of, this species (except in having the brown ring above the hoof) was shown to Professor Temminck by Mr. Children, he declared it to be the *Ane Isabelle* of Vaillant; but with all due respect to the knowledge of that naturalist, who so greatly excels in the knowledge of species, I am sorry that I cannot accord with him in this instance; although I must allow that he ought to know Vaillant's animals better than any other person, as that celebrated traveller was a constant correspondent of his; if it be that animal, Vaillant must have overlooked the bands, and I can hardly call it *Isabella* colour.

Sp. 3. *Asinus Burchellii*. Burchell's Zebra.

A. Albidus, nuchâ dorsoque fasciis alternis nigris et fuscis, nigris latioribus, lineâ dorsali nigrâ albido-marginatis; ventre, caudâ, artubusque infasciatis.

Equus Zebra. Male. *F. Cuvier. Menag. Mus.*

Equus Zebra. *Burchel. Trav. j. 139.*

Icon. Tab. 6. *Burchel. Trav. Vig. p. 252*, a tanning vat of the skin.

Inhabits Africa. The flat parts near the Cape, *Burchell. Mus. Brit. V. M.*

Description.—Body white; head with numerous narrow brown stripes, which gradually unite together and form a bay nose; the neck and body with alternate broad stripes of black and narrow ones of brown, the latter of which nearly fill up the interspaces between the black stripes, and only leave a narrow whitish margin. The dorsal line is narrow, and becomes gradually broader in the hinder part, distinctly margined with white on each side. The belly, legs, and tail, quite white; the mane alternately banded with blackish and white.

The figure of this animal, Plate IX. fig. 1. is from the skin in the British Museum, which was brought home by Mr. Burchell, and which will shortly be set up and exposed to public view.

The hoofs, as Mr. Burchell very justly observes, offer a good character between the Zebra of the Mountains and that of the Plains. In the latter, *A. Burchellii*, the edge of the hoof is narrow and sharp, the hinder part is flattish, and the centre is extended and concave: and in the former, or true Zebra, the edge and hinder part are thick and convex, and the centre deep and contracted.— See pl. ix. f. 3, *A. Zebra*: f. 2, *A. Burchellii*; both being diminished to one-half the natural size.

Sp. 4. *Asinus Zebra*. The Zebra.

A. albidus, capite corpore artubusque nigro-fasciatis, ventre albidò, lineâ mediâ nigrâ serratâ, lineâ dorsali indistinctâ.

Equus Zebra. *Lin. Sys. Nat.* j. 101.

Equus Brasiliensis. *Jacob. Mus. Reg.* 3.

Equus Montanus. *Burchel. Trav.* j. 139.

Hippotigre. *Dion. Lib.* 77.

Zebra Indica. *Aldrov.; Jonston. Quad.*

Zebra. *Ray. Quad.* 69. *Zeura*, or *Zuora*. *Lobo. Abyss.* j. 291. *Wild Ass. Kobben. Cape.* ii. 112. *Wild Paard. Burchell. Dauro. Hottentots.*

Zebre. *Buffon. Hist.* xii. 1.

Icon. Jonston. Quad. t, 5. f. 1. bad. *Jacob. Mus. Reg.* 3. t. 2. f. 1. *Laver. Mus. Reg.* t. 3. f. 18. *Buffon.* xii. t. 12! very good. *G. Cuvier. Menag.* t.—! *Edward. Glean.* j. i. t. 222. bad; bands too red. *Shaw. Zool.* t. 217. cop. *Edw. Bewick.* 22. very good.

Inhabits Africa. Mountainous parts of the Cape of Good Hope, *Burchell*. “Congo, Guinea, and Abyssinia,” *Ludolpe*.”

Description.—Fur white, with close narrowish black bands on the body, neck, and legs, and brown ones on the face; nose bay; dorsal line indistinct from the others. Belly and inside of the thighs bandless. Tail blackish. Mane erect, thick, bushy, banded with white. Ears, with two black bands and white tips.

Live in troops, on hard dry herbs, and are not capable of being tamed unless they are taken very young. The beautiful female that is in Exeter Change appears to be vicious, for she is fond of being taken notice of, but gradually sidles round, and attempts to kick at her fondler.

ART. XXXII. *Descriptions of three New Species of Lethrus.* By Professor FISCHER.*

1. *Lethrus scoparius*, niger, supra scabriusculus, infra villosus, tibiis anticis scopatis. Long. $8\frac{1}{2}$ lin : lat. 5. lin.

Lethrus scoparius, Fischer, lett. à Pander, p. 11.

Of the same size as *Lethrus cephalotes*, from which it differs in the scabrosity and villosity of the body; and in the auricles or wings of the head being larger and rather square. Head large like that of *cephalotes*, but rougher; clypeus with two longitudinal tubercles, apex reflected, auricles wider, rather square. Labrum and Mandibulæ hairy. Thorax rough with impressed dots, sides hairy, reflected. Scutellum broad at the base, triangular, rough with impressed dots. Elytra rough with dots, hairy. Body beneath hairy, feet very villose, legs distinctly toothed on the outside, hairy on the inside, hairs collected into a little brush near the apex. Inhabits the Southern steppes of Orenbourg. *Pander*.

2. *Lethrus longimanus*, nigrescenti-violaceus, nitidus, scabriusculus, tibiis anticis longis, totis dentatis. Long. $5\frac{1}{2}$ lin. lat. 4 lin.

Lethrus longimanus, Fischer, Lettre à Pander, p. 12. Coleopt. t. 13. f. 3.

Smaller than *Leth. cephalotes*, from which it differs in all respects. Head rough, with a frontal impression of confluent dots, auricles or lateral wings much dilated. Thorax rough with impressed dots, margins reflected on both sides. Scutellum short, triangular, grooved. Elytra joined together, much narrower than the thorax, and rather longer, rough, with several slightly impressed lines. Body somewhat villous beneath, the anterior feet smoother, the legs very long, compared with the thorax as $3\frac{3}{4}$

* Translated from his *Entomographia Imperii Russici*. tom. 1. p. 136, et seq.

lines to $1\frac{1}{2}$ lines ; all distinctly sex-dentate, with three spines at their apices. Posterior legs very spinose and hairy. Inhabits the Southern steppes of Orenbourg.

3. *Lethrus Podolicus* ; totus niger, thorace lævi, elytris rugosulis.

Long. 6 lin. lat. 4 lin.

Lethrus cephalotes, var. minor, *Besser in literis*.

Rather larger than the preceding, but as it appears to me distinct from *L. cephalotes*. Head with a broad rather square clypeus, porous ; the mandibles margined on the outside, beneath with a strong, rather incurved, abbreviated tooth. The auricles seem to form a single appendage. Antennæ proportionably longer and thicker than in *L. cephalotes*. Thorax smooth as in that species, but more reflected on both sides and behind. Scutellum very narrow, acuminate. Elytra rather rough, with impressed obliterated lines. Body beneath somewhat porous, feet pruinose, anterior legs serrated, smooth, with bristles, and one spine at the apex. Inhabits Western Podolia.

ART. XXXIII. *A Description of Two new Species of Helicinæ, and Explanation of the Figures to the Monograph. By Mr. J. E. GRAY, M.G.S.*

HAVING observed two new species of this genus on my late visit, in company with my friend Mr. Children, to the superb collection of the late Lord Tankerville, I have sent you a description, which I took at the time, to render my Monograph more complete, hoping in a short time to be able to give figures of them ; to which I have added an explanation of the figures of the other paper.

1*. *Helicina Tankervillii*.

Testa subgloboso-conoidea, acutè carinata, spiraliter squamulosa costo-striata, supra conica, infra convexa ; peristomate reflexo albido, labio medio sinuato, columellâ subincrassatâ.

Inhabits — ? *Mus. Tankerville.*

Shell nearly globose conical, white, with spiral rib striæ, which are crossed with slight concentric striæ leaving scales on the spiral ones, conical above, convex beneath, centre keeled, keel acute squamulose. Peristome reflexed white, with a slight groove opposite the keel, columella scarcely thickened, angular in front; axis $\frac{7}{8}$, diameter $\frac{6}{8}$ of an inch.

3*. *Helicina Maugériæ.*

Testa depresso-ovata, carinata, albida, lutea unifasciata, supra infraque conica convexa; peristomate subreflexo luteo, columellâ callosâ luteâ.

Inhabits. — ? *Mus. Tankerville.*

Shell depressed ovate, keeled, white, with a broad band near the central keel, leaving a white band near the suture, peristome slightly reflexed, pale yellow, columella callous, gibbous, amber yellow; axis $\frac{5}{16}$, diameter $\frac{1}{2}$ of an inch.

T. vi. f. 1. *Helicina pulchella.*

2. ——— neritella, and operculum.
3. ——— fasciata.
4. ——— substriata.
5. ——— Braziliensis.
6. ——— costata.
7. ——— viridis.
8. ——— aurantia.
9. ——— rhodostoma.
10. ——— major.
11. ——— submarginata.
12. ——— unifasciata.
13. ——— Brownii, and operculum.
14. ——— depressa.
15. ——— aureola.

ART. XXXIV. *Description of a remarkable Fossil found in Coal Shalé: with Observations. By J. D. C. SOWERBY, Esq. F.L.S.*

THIS fossil is of a lanceolate form and very slightly curved; beneath, it has a deep longitudinal canal with rounded edges, towards one of which the curvature is inclined; above, it is very convex, from the edges of the canal a number of sharp ridges pass obliquely over the surface, until they meet at acute angles directed towards the point, in the middle of the opposite side; for some distance on each side of the part where they meet these ridges are divided into small short spines. The larger end of the fossil tapers almost to a point, and for a considerable distance along it is destitute of those ridges that are connected together and form a coat upon the remaining portion. Internally it contains numerous, irregular, elongated, sinuose innosculating cavities, divided from each other by a compact substance which is rather browner than the shale, the cavities are filled with carbonate of lime of a dirty white colour; the ribbed coat is solid.

The specimen above described was communicated by Mr. Taylor of Bishops Wearmouth; it was found among a multitude of vegetable remains, in Shale, containing rather an unusual quantity of Mica, in Felling Colliery.

Suspicious have been entertained that this fossil is a seed-pod, or a shell resembling a Pinna; its internal structure however, sufficiently proves that it is neither a vegetable nor a shell; and as this structure corresponds to that of the fossil bones found in the Lias, there can hardly remain a doubt as to its real nature; the only difficulty is to ascertain its situation in the skeleton, and the Genus of animals to which it may be referred with some probability.

Judging from the size and number of the cells that composed it, it appears to have been very light when recent, and therefore belonged in all likelihood to a Bird, or to an Aquatic Animal, but most probably to a Fish. Observing that a portion of it is destitute

of the ribbed coat, and resembles the inserted portion of the first spiniform ray of the dorsal fin of the *Squalus Acanthias* (*Spinax* Cuvier), of *Balistes*, and of several other Fishes, we may conclude, I think safely, that if it be not really such a bone, it is at all events a partially exerted one, and such as we are not likely to meet with, either among the *Mammalia*, or in any other class, except Fishes. There is a somewhat similar lanceolate, arcuated, three-sided, and longitudinally ribbed bone, well known in the *Lias*, which has one and sometimes two rows of conical, curved teeth arranged along its concave side; this seems to connect the one before us with the long bony and toothed spine upon the tail of the Sting-Ray (*Raja Pastinaca*, Linn.) and, like that, is much more solid than Fishes' bones generally are; but as no attached bones have been yet discovered with these fossils, it is not possible to refer either of them to any known Genus.

The circumstance of that before us having occurred in the Coal Formation, is extraordinary; its accompanying apparently land vegetables can have very little weight, for Bivalve Shells are by no means rare, similarly situated in the Carboniferous Strata. The lateral curvature, and some irregularity in its form, seem to have arisen from distortion produced by pressure.

The accompanying figure, Plate VIII. f. 9 is of the full size of the specimen, a small portion of the larger end only being omitted.

ART. XXXV. *On the structure of Melania setosa.* By
Mr. J. E. GRAY, M.G.S.

IN the last number of the Quarterly Journal of Science, Mr. Swainson, has described a new shell, under the above name, which he observes has attracted considerable attention in the Conchological world, from the peculiar bristles-like processes, which are sheathed in its tubular spines; and Mr. Swainson has not a little added to this attraction, by his description of the shell, in which he ob-

serves, after some fanciful conjectures respecting the use of these bristles, that they are, "a formation altogether unprecedented amongst this class of animals," and he appears to conceive that these bristles are "rooted as it were into the body of the shell;" and he is not certain whether there are two, or one, forked in each tubular spine.

Now it happens that there are two specimens of this "new and most extraordinary" Shell in the British Museum, one of which was in the Cracherode Collection, n. 472, and named by Humphreys "*Spirilla spinosa*, fresh water spiral spined shell, from Admiralty Island, New Guinea," and another presented by Dr. Leach; both have to my knowledge been exposed to public view for upwards of three years, and I am very much inclined to believe that the *Buccinum aculeatum* of Lister's Mantissa, t. 1055. f. 8. is intended for this shell; but from the name of Humphreys, I some time ago named the specimen in the Museum *Melania spinosa*.

On examining these shells, which only differ from the *Melania amarula* in the sinus of the hinder (or upper of Mr. S.) part of the outer lip instead of being left an open vaulted spine as in that species, in this shell is closed into a tubular one with the Periostraca drawn in and inclosed in the tube, the processes of which form these bristles; Mr. S. remarks, that "in the genus *Voluta* we have many instances of shells being crowned with thin vaulted spines; but no examples can be produced of such coronated spines being tubular or completely closed on their circumference, and pervious at their summits:" this is all very true with regard to *Voluta*, but is that the only genus in which we are to look for an analagous structure? If the common *Neritina corona* be examined, which is a much more analagous shell, the spines will be found to be tubular, and longer than in this *Melania*; nor are the tubular spines confined to fresh-water species, for they are common to *Murex tubifer*, *M. Triplex*, and several other *Murices*; and to the *Pinnæ* and *Pectines* in bivalve shells.

In the figures of this Shell, (Pl. VIII. f. 6, 7, 8.) the manner in which the periostraca is gradually condensed on the side of the sinus, and produced into the spine, is attempted to be illustrated; the bristles are generally distinct from one another, but are some-

times very closely connected at their base, and indeed one or both of them are sometimes split into two parts; the base of the tube at length becomes closed by the deposition of shelly matter on the inside, and thus they do not become inbedded: I may conclude therefore that this shell does not exhibit any anomalous formation, but is constructed on the same general rules as all other shells are.

ART. XXXVI. *Abstract of a Monograph on a new Genus of Gasteropodous Mollusca, named Scissurella. By M. ALCIDE DESSALINES D'ORBIGNY,* with Notes by G. B. SOWERBY, F.L.S.*

In prosecuting my researches among the marine and fossil sands of various countries, in order to study the microscopic Cephalopoda which are found in them, I have discovered the elegant minute shells described in this memoir. The slit by which they are characterized is analagous to that of several of the *Pleurotomæ* among the *Muricidæ*; to that of the *Emarginulæ* among the *Scutibranchia*; and to that of the *Siliquaria* among the *Annelidæ*:† in fact

* Translated from the first volume of the *Memoires de la Société d'Histoire Naturelle de Paris*, p. 340.

† I have not thought it necessary to translate the note extracted from the report of Messrs. *Prevost*, *Desnoyers*, and *De Ferussac*, in which they endeavour to show that the Genus now denominated *Scissurella* by D'Orbigny, has been formerly published under the name of *Pleurotomaria*, given to it by *De France*, and adopted by *De Ferussac*, because I am of opinion that those Naturalists, as well as M. D'Orbigny are really mistaken: the following are my reasons: 1st, that in all the specimens but one, of D'Orbigny's genus, that I have seen, amounting to about a dozen, the slit does not continue to the edge of the shell; but as in *Haliotis* and *Fissurella* (the only shells that possess the slightest analogy) it forms a more or less elongated perforation, in the upper part of the last volution, while the continuation of the lip is entire: 2ndly, that as in this circumstance it differs materially from *Pleurotomaria*, it should constitute a new Genus: 3dly, that consequently its nearest analogy, contrary to M. D'Orbigny's assertion, is with the *Fissurellæ* and *Haliotides*: 4thly, that it cannot therefore belong to the family of *Trochoidæ*. Considering the great diversity of character that exists between the very young and the full grown shells of the same species, and also considering that the shells in question are very minute, though we

the *Scissurella* fills up among the *Trochoidæ*, a chasm in the series of conformations, observed in the aperture of the Shells of different families of the *Mollusca* and *Annelidæ*. The slit, which is the principal character, and from which the genus is named, positively indicates a peculiar organization in the animal which inhabits it, and has appeared to me of sufficient importance to authorize the formation of a new genus; the following are its characters.

SCISSURELLA. Testa univalvis, libera, umbilicata, spirâ depressâ, aperturâ subrotundatâ, labiis disjunctis, canali peristomateque nullis: margine dextro labii supernè profunde emarginato; emarginatione incrementum anfractuum secutâ, ferè usque ad marginem aperturæ obliterated, et carinam in dorsum testæ notante.

Shell univalve, free, umbilicated, with a depressed spire, aperture rather rounded, without a canal, its lips without a peristome and disjoined: right lip notched with a deep slit, following the growth of the volutions, obliterated to within a short distance of the margin, and forming a sort of keel upon the back of the shell.*

SPECIES 1.

Scissurella lævigata, testâ ovali, lævi, albâ, translucente, tenui, fragili, apice depresso, anfractibus tribus, lineis incrementi tantum notatis.

shall not be justified in pronouncing such a judgment until an actual acquaintance with the appearance of those genera as they emerge from the egg, shall enable us to do so with precision, yet we need not hesitate to suggest the possibility, of the *Scissurella* proving to be either an *Haliotis* or a *Fissurella* just emerged from the egg?

* Supposing from the fact I have before stated, that the slit or notch mentioned in this character only retains that form while the shell is quite young, and that as it arrives at its more mature age the margin becomes entire, I should propose the following as an alteration of the character of the genus; "*prope marginem dextram foramine oblongo, incrementum anfractuum secuto, et carinam in dorsum testæ notante.*" "An oblong foramen near the right lip, following the growth of the volutions, and forming a sort of keel upon the back of the shell. I think also that the words "*peristomate acuto*" should be added to the character of the genus, as it will be observed that the edge of the peristome is described as sharp in every species.

Found on the Coasts of the Mediterranean, among the Fuci and Ceramia, where it is very rare. Length two *millim.*

Shell oval, smooth, white, translucent, thin, fragile, apex depressed, volutions marked only by the lines of growth, without the ribs or grooves which characterize the three following species. The space between the two edges of the obliterated part of the slit, (each of which edges forms a ridge) is smooth, without transverse lines, and obliterated to within a short distance of the edge of the aperture, the umbilicus has several very fine circular striæ; the aperture is oval, longer than it is broad; peristome sharp-edged.

SPECIES 2.

Scissurella costata, testâ ovali, albâ, translucente, fragili, apice depresso, anfractibus tribus, supernè costis transversis, elevatis, distantibus; infra costis prominentioribus, ferè acutis.

Found in the same situations as the last. Length one *millim.*

Shell oval, white, translucent, fragile; apex depressed, volutions three, the upper part furnished with transverse, elevated, distant ribs; ribs beneath more prominent, and almost sharp-edged. The intercostal spaces are nearly smooth. The two edges of the slit form two ridges, the interval of which, in the obliterated part, is strongly marked with close transverse lines; umbilicus surrounded by circular striæ; aperture nearly quadrangular; peristome sharp-edged.

SPECIES 3.

Scissurella decussata, testâ ovali, tenui, fragili, decussatâ; apice depresso; anfractibus tribus, costis supra et infra, transversis, numerosis.

Found in the Fossil sand of Castel-Arquato in Piacenza. Length one *millim.*

Shell oval, thin, brittle, decussated, apex depressed, volutions three, marked above and below with numerous transverse ribs or salient grooves, the intercostal spaces have close-set, deep, longitudinal striæ; the space comprised between the two raised edges of the slit is marked, in its obliterated part, by broad, distant grooves.

SPECIES 4.

Scissurella elegans, testâ ovali, ventricosâ, spirâ papilliformi, elevatiusculâ; anfractibus quatuor, costis transversis, minùs prominentibus, distantibus, longitudinaliter striatis.*

Found with the last. These two species are very rarely entire, on account of their extreme brittleness. Length two *millim*.

Shell oval, ventricose, fragile, spire nipple-shaped, less depressed than in the other species; volutions four, with transverse slightly salient ribs, distant from each other, and each marked with superficial longitudinal striæ, which give the shell a finely decussated appearance: the space between the two edges of the obliterated part of the slit is smooth, and narrower in this than in the preceding species: around the umbilicus is seen a smooth space, instead of the circular lines remarkable in the first three species: the aperture is rounded, and the peristome sharp-edged.†

ART. XXXVII. *MULLERIA*, a new Genus of Fresh-water Bivalves, of the Family of *Ostreaceæ*, established by M. LE BARON D'AUDEBARD DE FERUSSAC.

WE do not intend here to give the characters of this genus, because we reserve most of the particulars relating to it for an opportunity, which will shortly occur, of illustrating them by a plate: we only wish at present to notice the addition of a genus

* I have been obliged to alter some of the expressions used by the author, because in his description of this species he has used several terms of comparison with the other species; thus I have used "*elevatiusculâ*," instead of "*moins déprimé que celui des autres espèces*."

† The shortness of the time now before us, renders it impossible to add the description of one or two other species which I possess: these I propose giving in the next number; together with the descriptions of several other curious little fossils found in the Fossil Sand of the neighbourhood of Paris, and some further observations upon the *Scissurellæ*.

of river shells of the Family of *Ostreaceæ* to the catalogue of those already known as inhabitants of fresh-water.

If to the Families of *Cycladæ* and *Naiadæ*, or bivalve shells belonging exclusively to rivers and lakes, be added two genera of *Mytilidæ*, (*Mytilus* and *Modiola*); one genus of *Corbulidæ*, (not yet named; one genus of *Chamaceæ*, (*Etheria*); one of *Macridæ*, (*Nucula*); and one genus of *Ostreaceæ*, (*Mulleria*); a catalogue will be formed of all the Genera of Bivalve *Mollusca*, hitherto known to inhabit fresh-water. Does not this prove the absolute necessity of Geologists becoming *thoroughly* acquainted with at least all the Genera of Shells, before they undertake to determine the nature of any formation containing fossil remains of Shells? Is it not a fact that will help to establish the truth of some observations I formerly made upon the real nature of a bed, said by Geologists to be *marine*, and which is interposed between two others of *undoubted* fresh-water origin? Does it not, in fact, prove that we are yet in the infancy of our knowledge of the Natural Sciences, particularly as it respects Geology?

G. B. S.

ART. XXXVIII. *Analytical Notices of Books.*

Monographia Tenthredinetarum, Synonymia extricata. Auctore Am le Peletier de Saint-Fargeau, Societatis Parisiensis Historiæ Naturalis Membro. 8vo. Paris, 1823. p.p. 176.

WE can never hope to be thoroughly acquainted with the species of Insects but through the medium of Monographs, and we do most sincerely wish that Entomologists would keep this in view; but we must beg to observe, that merely collecting the scattered descriptions of the Insects composing a group or family, can never be deserving the name of a Monograph, nor will much credit ever be attached to him, who is a mere compiler, especially

in Natural History, for it is solely from this very cause, that so much confusion has arisen in every branch of Zoology. It is the duty of him who attempts a Monograph on any genus, or family of animals, to collect all the former descriptions, to compare such with the individuals, to describe the new species, and to digest the whole. We know the loss of time and the difficulty of the task ; but it is of importance, if we would wish to render such a work useful to the scientific ; and it must be considered of importance, for the nature of a Monograph, ought to be to determine and ascertain the history of the individuals to a certain date, to do which we consider that every cabinet ought to be examined. How far M. de Fargeau has had this in view, is not in our power to say, but we cannot help thinking, that his researches in this respect have been limited, and his materials rather scanty ; for in very many instances, his descriptions appear to have been taken solely from the works of Fabricius, Klug, Leach and Latreille : no one can have a greater respect for those very justly celebrated Entomologists than ourselves, and no one can find fault with their descriptions in general ; but so few additional species, comparatively, occur in the work before us, and so little light is thrown on their history, that we cannot but remark, that our author would have done well to have sought further. It is not the cabinets of England, France or Germany, individually, that will ever afford the materials for a perfect Monograph ; there are many very valuable and very extensive collections in each country, and without a thorough knowledge of the contents of each, every attempt must be fruitless ; there are few Entomologists who have not observed, in almost every cabinet, should it consist of provincial insects alone, species that are new, or but imperfectly described : besides this, how many are continually being received from the Brazils, India, New Holland, &c. We do not wish by these observations to throw the least obstacle in the way, or to depress the ardour of the industrious Entomologist ; but in his movements he must be cautious ere he presents the world with a feeble Essay, and gives it a name of a Monograph. It is highly praiseworthy in any one who will attempt to illustrate this very interesting branch of Zoology ; but in our present limited knowledge of this subject,

unless the means and opportunities of its author be very extensive, he had better content himself, (if he has Science at heart,) to describe those species which may appear new ; by which means he is gradually advancing the science, and his labours will be duly appreciated by every lover of Natural History.

How many Monographs have issued from the press, when in the course of a very short time, the number of the species has been nearly doubled ! : nothing can convince us more of the futility of attempting such a work, without years of labour and patient investigation. Did the illustrious author of *Monographia Apium Angliæ*, collect the materials and the observations of his invaluable work in a few months ? No, it was the work of years of assiduous labour and minute observation ! ; by which means he obtained those valuable facts, which nothing but time and intense application could ever have enabled him to possess. We wish to see a few more such works ; for we consider, that if Entomologists, instead of accumulating and forming extensive collections, and vying with each other in the number of their species, would limit themselves in some measure, and pay a little more attention to the economy of certain Families, we should hope that in a few years much good would result, and that we might anticipate that development of the delightful system of Nature, and that view of the distribution of its creatures, which it is only by patient investigation that we may ever hope to attain.

Systematic works on Entomology will but seldom bear quotation ; we shall therefore merely give an outline of the Synopsis of the Genera, with the number of species described under each ; which we consider will be as much as can be required from a work of this nature.

TENTHREDINETÆ.

A. Antennæ articulis pluribus quàm decem.

I. Cellulæ radiales, 3 ; cubitales, 3. Antennæ setaceæ.

Ovidepositorium abdomen multum superans.

Divisio, a XYELA, *Dalmann*, contains 2 species.

II. Cellulæ radiales, 2.

1. Cellulæ cubitales, 4.

- * Antennæ setaceæ. Ovidepositorium abdomen cylindricum superans.

Div. *b.* XYPHIDRIA. *Latr.* 4 species.

- ** Antennæ setaceæ. Ovidepositorium abdomen depressum vix superans.

Div. *c.* LYDA. *Fabr.* 35 species.

- *** Antennæ pectinatæ aut serratæ.

Div. *d.* TARPA. *Fabr.* 7 species.

- **** Antennæ apice crassiores. Corpus elongatum, compressum.

Div. *e.* CEPHUS. *Fabr.* 14 species.

- ***** Antennæ subclavatæ. Corpus crassum.

Div. *f.* ATHALIA. *Leach*, 11 species.

2. Cellulæ cubitales, 3. Antennæ subclavato-capitatæ.

Div. *g.* CIMBEX. *Fabr.* 36 species.

III. Cellula radialis 1. appendiculata.

1. Cellulæ cubitales 4. Antennæ clavato-capitatæ.

This division includes the genera *Trichiosoma*, *Clavellaria*, *Zaræa*, *Abia*, and *Amasis* of Leach.

Div. *h.* PERGA. *Leach*.

2. Cellulæ cubitales 4. Antennæ maris pilosæ; fæminæ clavatæ, nudæ.

A genus of New Holland insects, 6 species, from the descriptions of Dr. Leach.

Div. *i.* HYLOTOMA. *Leach*, 27 species.

3. Cellulæ cubitales 3. Antennæ fæminæ filiformes pilosæ.

Div. *k.* PTILIA. *Fargeau*, 3 species.

4. Cellulæ cubitales 3. Antennæ pectinatæ aut serratæ.

Div. *l.* PTERYGOPHORUS. *Klug*, 3 species.

IV. Cellula radialis 1, non appendiculata.

1. Cellulæ cubitales 4. Antennæ maris pilosæ, fæminæ clavato-subpilosæ.

Div. *m.* CRYPTUS. **Jurine*, 4 species.

* This name has been preoccupied by Fabricius for a genus of the Ichneumonidæ.

2. Cellulæ cubitales 3. Antennæ maris pennatæ, fæminæ pectinatæ.

Div. *n.* LOPHYRUS. *Latr.* 12 species.

B. Antennæ articulis novem.

I. Cellula radialis 1. non appendiculata.

1. Cellulæ cubitales 3. Antennæ pilosæ, articulis post 2^{um} obliquè insertis.

Div. *o.* CLADIUS. *Klug*, 5 species.

2. Cellulæ cubitales 3. Antennæ pilosæ, articulis omnibus rectis.

Div. *p.* PRISTIPHORA. *Latr.* 9 species.

3. Cellulæ cubitales 4. Antennæ filiformes.

Div. *q.* NEMATUS. *Jurine*, 38 species.

II. Cellula radiales 2.

1. Cellulæ cubitales 4. Antennæ filiformes, aut apicem versùs crassiores.

These are divided into 3 sections, from the colours of their antennæ.

Div. *r.* TENTHREDO. 122 species.

2. Cellulæ cubitales 3. Antennæ filiformes.

Div. *s.* DOLERUS. *Jurine*, 34 species.

The above, with 46 under the head of incerta sedis, comprise in the whole 419 species.

So far as its compilation, we should consider the work of M. De Saint-Fargeau, to be of some use to the British Entomologist, as it embraces all the species described by Klug, Leach, &c.; and what few new species occur are European, and appear to be minutely described. In England we have about 250 indigenous species already known, which is certainly a very large proportion in comparison with other European groups of Insects.

Annales des Sciences Naturelles. By A Society of Naturalists.

Under this title a periodical work has commenced in Paris, with the current year, and promises to be very useful. It is intended to contain original papers upon all the branches of Natural Science that are usually considered as purely Scientific, with translations and extracts from other works; but confined principally to the Animal and Vegetable Kingdoms.

The following original papers connected with Zoology have appeared in the first five numbers, with illustrative plates; together with several others upon Geological and Botanical subjects.

A new theory of Generation, embracing the history and description of Spermatic Animalcula; in a series. By Messrs. PREVOST and DUMAS.

A Memoir upon a *Larva* that feeds upon *Helix nemoralis*, and the insect produced by it, which is named *Cochleoctonus vorax*. By the Count IGNATIUS MIELZINSKY.—To this paper Mons. LATREILLE has added a note.

Extract of a Letter from M. DE FREMINVILLE; giving an account of some of his discoveries in Zoology, &c. in a voyage along the Western Coast of Africa.

Anatomical researches upon the *Thorax* of articulated Animals, particularly that of hexapode Insects. By VICTOR AUDOIN. A series of chapters.

Some considerations respecting *Medusæ*. By Messrs. QUOY and GAIMARD. With descriptions of *Cyanea rosea*, and *C. Astier*, two species hitherto unnamed.

A Note upon a new Genus of the Family of *Neritaceæ*. By Mons. G. P. DESHAYES. The Genus here described is the *Pileolus* of Sowerby, to which Mons. Deshayes has added a third species, which he has named *Pileolus Neritoides*; it is very much like *Neritina Altavillensis*.

Description of a new species of *Arachnidæ*, Genus *Epeira*, Walcknaer. By Mons. C. VAUTHIER.

[Of this and the following two articles, we have given translations in the present number, at p. 223, 224, and 233.]

A correction of the Generic Character of *Bellerophon* of Montfort. By M. DEFRANCE.

Memoir on an American Bat, forming a new species of the Genus *Nyctinomus*. By M. ISIDORE GEOFFROY ST. HILAIRE.

Description of a new species of *Coluber*, named *Coluber Richardi*. By M. BORY DE ST. VINCENT.

Observations upon the pretended Bones of the Ear, found by M. Weber, Professor of Comparative Anatomy at Leipsic. By M. E. GEOFFROY DE ST. HILAIRE.

Notice relating to the *Pulex irritans*. By M. DEFRANCE.

Notice relative to the modifications of the Shell of certain kinds of Adhering Mollusca. By M. DEFRANCE.

On a preserved head of an inhabitant of New Zealand. By M. LEON-DUFOUR.

New observations upon the *Ornithorhynchus*.

Anatomical researches upon the *Lithobius forficatus* and *Scutigera lineata*.

On the vestiges of placentary organization and of an umbilicus, discovered in a very young fœtus of *Didelphis Virginiana*. By M. E. GEOFFROY DE ST. HILAIRE.

The figures are lithographic, in a separate quarto atlas, and are in general well executed.

British Entomology. By JOHN CURTIS, F.L.S.

SINCE we first noticed this work several more numbers have appeared, in which we regret to observe, that contrary to the expressed wish of all scientific Entomologists and Entomological Students, to whom the work is intended to be useful, the author still adheres to his plan of adding to his beautiful and correct plates of the Genera of British Insects, insufficient specimens of plants, frequently in nowise connected with their accompanying insects: we say *frequently*, for out of sixteen plates in these four numbers, only five of the plants figured have any real connection with the insects: this is the more to be lamented, because in the title of the work the author professes to give figures of *the plants*

upon which the insects are found, while several of the plants given are scarcely, if ever, touched by any insects whatever.

No. 3 contains, tab. 11, *MOLORCHUS minor*, found upon the blossoms of a tree at Arno's Grove, and figured upon the seeds of *Æthusa Cynapium*, (Fool's Parsley); tab. 12, *LYCÆNA dispar*, taken in considerable abundance flying among reeds about the centre of Whittlesea Meer, Huntingdonshire, in the beginning of August, 1822 and 1823; tab. 13, *EUMENES atricornis*; tab. 14, *HÆMOBORA pallipes*, an insect belonging to Latreille's family of Diptera, *Eproboscidea*, which subsists upon the blood of Quadrupeds and Birds, but figured with *Caucalis Anthriscus*.

No. 4 contains, tab. 15, *OMASEUS aterrimus*, a genus of the Family of *Carabidæ*, which is found in the decayed stumps of trees:—here our author triumphantly exclaims, that the *Peziza aurantia* being found at the roots of decayed trees, accompanies the insect in the plate; and so he traces a connection between *Omaseus aterrimus* and *Peziza aurantia*. Tab. 16, *PERONEA ruficostana*; tab. 17, *CRÆSUS septentrionalis*; tab. 18, *EMPIS borealis*, which he tells us has been taken upon the flowers of the willow; but he gives the *Taxus baccata*, Common Yew-tree.

No. 5 contains, tab. 19, *RHIPPIPHORUS paradoxus*; tab. 20, *PENTATOMA cærulea*; tab. 21, *EYPREPIA Russula*; tab. 22, *IBALIA cultellator*.

No. 6 contains, tab. 23, *SIAGONUM quadricorne*; tab. 24, *GASTROPACHIA quercifolia*; tab. 25, *PSEN equestris*; tab. 26, *ATHERIX Ibis*.

Genera of Recent and Fossil Shells.

The 23d number of this work has just made its appearance; it contains the following Genera, viz.—*Pholas*, with a figure of a fine specimen of *Pholas costata*, drawn from a specimen brought from Mexico by Mr. Bullock: *Lithodomus*, a genus of perforating bivalves, generally found in Corals, Madrepores, and Limestone Rocks: *Cassidaria*: *Calyptræa*, of which two plates are given,

showing several variations in the form of the internal lateral appendage: and *Crepidula*, with figures of six very distinct species.

Mineral Conchology of Great Britain.

The 79th number contains, tab. 456, f. 1, *Tellina striatula*, and f. 2, *T. inæqualis*, both from the green sand of Blackdown. Tab. 457, two figures of a most singular fossil called *Orthocera paradoxa*, from the Mountain Limestone in Ireland. Tab. 458, f. 1, *Nautilus expansus*, from the Chalk Marl at Hamsey; f. 2, *N. biangulatus* from the Mountain Limestone near Bristol. Tab. 459, f. 1, *Producta fimbriata*; f. 2, *P. plicatilis*, both from the Derbyshire Mountain Limestone: f. 3, *P. depressa*, from the Dudley Limestone. Tab. 460, f. 1, *Acteon crenatus*; f. 3, *A. elongatus*, both from the London Clay at Barton Cliff; f. 2, *A. striatus*, a crag fossil. Tab. 461, f. 1, *Spirifer rotundatus*, f. 2, *S. cuspidatus*, var.

No. 80 contains, tab. 462, *Sanguinolaria compressa*, from Barton Cliff: tab. 463, f. 1 and 2, *Nerita spirata*, from the Mountain Limestone; f. 3 and 4, *N. minuta*; f. 5 and 6, *N. costata*, both from the Oolite at Ancliff: tab. 464, several species of *Bullæ*: tab. 465, *Auricula ventricosa* and *buccinea*: tab. 466, *Saxicava rugosa*: and tab. 467, *Myoconcha crassa*; the descriptions of the last three plates will be given in No. 81, we do not therefore make any remarks at present on the new Genus here proposed.

DE LA BECHE'S *Selection of Geological Memoirs.*

Mr. De la Beche has recently published, translated into English, an useful selection of the Geological Memoirs contained in the *Annales des Mines*; among which are the following articles on Zoological subjects:—*Extract of a Memoir on the possibility of causing fresh-water Mollusca to live in salt-water, with Geological applications.* By M. Beudant.—*On the Zoological characters of formations, with the applications of these characters*

to the determination of some Rocks of the Chalk Formation. By M. Alexander Brongniart. The latter contains lists of the organic remains in the Gray Chalk and Chalk Marle, (*craie tufau*) and Green Sand (*glauconie craieuse, craie Chloritée*) of Rouen, Havre, and their vicinity; of the environs of Perigueux; of the Perte du Rhône near Bellegarde; and of the rocks and mountains of Fis, Sales, &c. forming part of the Buet Chain in the Savoy Alps. They are identified by reference to the figures of Sowerby, A. Brongniart, Defrance, and others. A lithographic plate of the fossils of the marle beds of the compact Jura limestone, and another of the Montagne des Fis, accompany the paper.

ART. XXXIX. *Literary Announcements.*

DESHAYES' *Coquilles Fossiles des Environs de Paris.*

WE are happy to announce the commencement of a work, entitled "Description des Coquilles fossiles des Environs de Paris, par G. P. Deshayes, Membre de la Société d'Histoire Naturelle de Paris." From what we know of the extensive collections, the numerous discoveries, and the considerable resources and talent of the author, we anticipate a very complete account of these interesting and beautiful fossils, particularly those of the Tertiary beds. The work will appear in monthly numbers in 4to.

TEMMINCK'S *Mammalogie.*

The celebrated Temminck has in the press a work, entitled "Monographies de Mammalogie," to contain elucidatory observations upon many Quadrupeds, respecting which there have been doubts; and descriptions and figures of many new species: to be published in numbers, in 4to, and not to exceed two volumes.

Histoire Naturelle des Mammifères. By GEOFFROY ST. HILAIRE and FREDERIC CUVIER.

This magnificent work, which has been suspended for a short time, in order to collect new materials, is now about to be recommenced. In the 44th, 45th, and 46th Livr., will be given Titles and Indexes to the two volumes already published. An edition of a similar work, in 4to, is announced at the same time, destined to supply the place of the larger work, at a cheaper rate.

“Species Conchyliorum.”

Messrs. Sowerby announce their intention of publishing in Numbers, coloured figures and descriptions of all the Species of Shells, whether recent or fossil; including, with those that are at present described, such other species as have not yet been noticed in other works.

ART. XL. *Proceedings of Learned Societies on subjects connected with Zoology.*

ROYAL SOCIETY.

Feb. 19.—A paper was read, *On the Semi-decussation of the Optic Nerves*; by W. H. WOLLASTON, M.D. V.P.R.S.”

It has been generally concluded by anatomists, and they support the conclusion from the observation of the arrangement of the optic nerves as distinctly seen in certain kinds of Fishes, that in the human eye, the optic nerves, after passing from the thalami nervorum opticorum, meet, and then proceed apparently in union, though in reality still separate; so that the right eye is believed to be entirely supplied with these nerves from the left thalamus, and the left eye from the right thalamus: and this arrangement is called the *decussation of the optic nerves*. The consideration

of a particular species of blindness, however, has led Dr. Wollaston to a somewhat different distribution of the optic nerves. After fatigue, arising from four or five hours' violent exercise, Dr. Wollaston was affected by a partial blindness, of which he first became sensible by seeing only half the face of a person near him, and next by seeing only the termination "son" of the name "Johnson;" this blindness was to the left of the point of vision in each eye; it was not perfect darkness, but merely a dark shade; and in about fifteen minutes, it gradually passed off, in an oblique direction upwards towards the left. As it was referable to an affection of the nerves, Dr. W. did not apprehend or experience any return of it, other nervous affections being produced by fatigue. Some years afterwards he again experienced this singular kind of blindness, without any obvious cause, and first became sensible of it likewise by seeing only the half of a person's face; but in this case the right side of both eyes was affected, and complete vision was suddenly restored by the joy produced on receiving information of the safe arrival of a friend from a hazardous enterprize. Dr. Wollaston has a friend who has experienced the same affection for seventeen years past, whenever his stomach is considerably deranged: another friend was attacked by pain at the left temple, and at the back of the left eye, which was succeeded by this sort of blindness on the right side of each eye; he can see to write,—see the paper he is writing upon, and the pen he writes with,—but not the hand that guides the pen. The affection in this case, Dr. W. fears, is a permanent one; the pain first experienced seems to have arisen from some effusion causing a degree of pressure on the brain, and the blindness from the continuance of this pressure on the left *thalamus nervorum optico-rum*.

Now all these cases seem referable to the partial insensibility of each retina, and they indicate that the left side of the retina in each eye is supplied with nerves from the same *thalamus*, and the right from the opposite *thalamus*; so that the nerves supplying the former alone *decussate*, and not those of the right side; an arrangement which Dr. Wollaston calls the *semi-decussation of the optic nerves*.

Dr. Wollaston proceeds to illustrate this statement of the distribution of the optic nerves, from that observed in those of Fishes: in the Sturgeon the eyes are diametrically opposite each other, each on one side of the head, the left eye being entirely supplied with nerves from the left thalamus of the brain, and the right eye entirely from the right thalamus. The blindness above described, Dr. W. remarks, does not appear to be rare, but is seldom particularly noticed, like many other things, because it is not understood.

This very interesting paper concludes with a short section in which Dr. Wollaston applies the sympathy of structure in the eyes, indicated by the effects just noticed, to the explanation of the long agitated question respecting the cause of single vision with two eyes. Every point in each eye is supplied with a pair of filaments from the same nerve, and the two eyes thus sympathize with each other in every point: hence arises single vision; and hence also the reason why infants direct both eyes in a corresponding direction, instead of squinting.

March 4.—A letter to the President was read, from Sir E. HOME, Bart. V.P.R.S. entitled *Some curious Facts respecting the Walrus and Seal, discovered in the Examination of Specimens brought home by the late Expeditions, from the Polar Circle.*

As the late various expeditions to the northern regions had been planned, primarily, by the President and Council of the Royal Society, Sir Everard Home wished to lay before the Society some curious facts which he had ascertained in the examination of some specimens brought home by them. This he was desirous of doing before the officers who were to proceed on the new expeditions should have left our coasts, in order that they might know that their exertions were important to science in various respects, besides the grand objects of their researches; and that they might likewise know that the pickle or brine in which provisions are preserved at sea is well adapted to the preservation of the internal parts of animals, preserving them in a better state for examination, dissection, and injection, than when they have been long steeped in spirits.

The first discovery Sir Everard had to state was, that the hind flipper or foot of the Walrus is provided with means for enabling the animal to walk in opposition to gravity precisely analagous to those possessed by the Fly, and the use of which could not have been suspected, had not the previous discovery been made respecting the latter animal, as described in the Phil. Trans. for 1816. Sir Everard at once recognized this structure on seeing a mutilated foot of the Walrus, and, in consequence, had requested his friend Capt. Sabine to procure him a specimen of the animal, which Capt. S. had accordingly done, with the aid of the assistant-surgeon of the vessel in which he sailed. The examination of this specimen showed, that in the hind foot of the Walrus there is a cup for enabling the animal to produce a vacuum, and thus to walk in opposition to gravity exactly like the two cups with which the Fly's foot is provided. The apparatus in the latter required magnifying 100 times to make the cups distinctly visible, but in the Walrus it was diminished four times to bring it within the compass of a quarto plate. The author, when writing his former papers on the Fly's means of progression, had not been able to determine the use of the two points in the foot of that animal; Mr. Adams had called them *pickers*, and had supposed that they were inserted in the cavities of the surface over which the animal was walking, and thus retained it in opposition to gravity,—an opinion which Sir Everard Home deemed undeserving of consideration; though he could not assign any use to the points in question. In the foot of the Walrus, however, it is evident that the two toes which answer to the points in that of the Fly are used for the purpose of bringing the web closely down upon the surface traversed, so as to enable the animal to form a more perfect vacuum, and that the air is re-admitted on their being lifted up. This part of the paper was illustrated by a drawing by Mr. Bauer; and it was singular, Sir Everard observes, that that gentleman should have had to delineate the same organ in two such different animals.

The second fact described in this paper also relates to the Walrus. The bile in this animal is received from the liver by a lateral communication into a large cylindrical reservoir, with much

mucus in its coats, and is thence impelled with considerable force into the duodenum. The œsophagus is wide, admitting of large masses of food being swallowed, and of regurgitation: the opening of the pylorus is small and valvular, preventing the passage of its contents back again into the duodenum: the structure of the duodenum, pylorus, and adjacent organs, is very similar to that of those of the Seal. It had been observed by Mr. Fisher, the astronomer to the late expedition under Capt. Parry, that the food of the Walrus is the *Fucus digitatus*, which is found in great abundance in the Arctic seas, thrown up on the shores by the waves, and also beneath the ice.

The third fact to which Sir Everard Home adverts in this communication relates to the structure of the funis and placenta of the Seal, as observed in a specimen of those parts brought home by Lieut. Griffiths, one of the officers in the late expedition under Capt. Parry. The vessels composing the former are not twisted, and are about nine inches long; at the distance of three inches from the placenta, they anastomose into blood-vessels, which are connected with the placenta by three membranous coats; the whole conformation giving great freedom to the embryonic circulation. Drawings of this subject and that last noticed, made by Mr. Rose, a pupil under the author at St. George's Hospital, are annexed to the paper.

March 25.—A letter to the President was read, from L. W. DILLWYN, Esq. F.R.S., *On the Geological Distribution of Fossil Shells*, in continuation of his former paper on that subject, published in the Philosophical Transactions for 1823, and noticed in the former number of this Journal, p. 120.

The present communication contains further remarks on the relative periods at which the various families of Testacea appear to have been first created; and suggests, that a regularly approximating series may be observed, from the fossil remains of the oldest formations, to the living inhabitants of our seas and rivers. It is the author's opinion, that those Fossil Shells which cannot be referred to any of the Natural Orders into which the living Testacea have been divided, are only to be found in the beds below the Oolites; and that in the Secondary beds above the

Lias, all the fossils may be referred to some of those orders. In the Tertiary beds, the approximation is progressively extended, and the shells of the London Clay may all be referred to some existing Genus; but no fossil can be completely identified with any living Species, except in those uppermost beds, which lie between the London Clay and our present creation. Mr. Dillwyn likewise gives some further observations on the changes which took place when the Chalk deposits were completed, and additional reasons for believing that the Mollusca in our latitudes then required a more perfect protection, either from their enemies, or from the surrounding elements, than afterwards became necessary. He also notes the exceptions to the inference in his former paper respecting the *Aporrhaides*’, and other fossil Trachelipodes’, occurring in secondary formations, feeding only on dead animals, which are afforded by the perforated shells in the denuded tracts of Green Sand in Devonshire; and alleges some reasons for suspecting that a mixture of strata may have occurred at the time when those denudations took place.

April 1.—The reading was commenced of *An Inquiry respecting the nature of the luminous power of some of the Lampyrides; particularly of L. splendidula, L. Italica, and L. noctiluca*; by TWEEDIE JOHN TODD, M.D.: communicated by Sir E. HOME, Bart. V.P.R.S.

April 8.—The reading of Dr. Todd’s Inquiry was resumed and concluded. It commences with some general remarks on the various causes to which the luminosity of the Lampyrides has been ascribed; the explanation of Macartney and Macaire, that the light they emit is a simple product of vitality being considered as the true one. Dr. Todd then proceeds to a minute account of the apparent source and characters of the light in the several animals; describing the manner in which its emission is affected by solar and other light, by heat, and by certain chemical agents respectively. In the *Lampyris splendidula*, the light is of a fine topaz-yellow colour, with a tinge of green, and is extremely vivid within the compass of a few inches, but does not extend its brilliancy far around; within that space the hour may be seen on a watch by its means. The light of the

Fire-fly is of a pale yellowish tint, with continual flashes of vivid light: its variations are not connected with the motions of the insect's wings, nor are they produced, as some have affirmed, by the frequent intervention of a membrane. This animal may be seen shining in full moon-light; which is not the case with its congeners. The luminous power of these Insects resides in an adhesive, transparent, granulated substance, deeply penetrated, according to Macaire, with nervous filaments. This substance continues to shine, when amputated, for a space of time never exceeding twenty minutes, and that in any medium; as under mercury, in water, in various gases; and in vacuo. When the life of the animal and the ordinary luminous power have both been destroyed by strong poisons, as tincture of *Nux vomica*, &c. a fixed light appears, which continues for twelve or fourteen hours. Irritants excite the luminous power in all cases, and disorganizing substances destroy it. Dr. Todd concludes that this power is solely an effect of vitality, and that the light may be considered as *animal light*; being analogous to animal heat, which, he observes, arises from a power of separating heat from its combinations with matter. He adopts the hypothesis that its principal use is that of guiding the male insects to the female, in the season of sexual congress: the males always approach any light; and sometimes even the shining females of other species, until they come very near them. The fact that the larvæ and even the ova possess a degree of the luminous faculty, Dr. Todd does not consider as militating against this explanation; for various organs are partially developed in the earlier stages of many animals, which are only to be used by them when arrived at their perfect state.

May 6.—The reading was commenced of a paper *On Univalves*; by CHARLES COLLIER, Esq. Staff Surgeon; communicated by Sir James Mac Gregor, Bart. F.R.S.

May 13.—Major Charles Hamilton Smith, of Guernsey, A.L.S. author of several Zoological papers in the Linnean Transactions, was elected a Fellow of the Society; and the reading of Mr. Collier's paper was concluded.

Mr. Collier commences this paper, by stating that he had once

purposed to frame a classification and nomenclature of the Testaceous Mollusca, quite independent of the shells they inhabit, but had found such arrangement impracticable, from various causes; among which was that of Mollusca, of the same features and structure, inhabiting very different shells. Besides, he remarks, the study of Conchology will always be pursued, by persons who are not interested in the comparative anatomy of the animals inhabiting the shells. He then proceeds to describe, from actual research, the characters of Univalves, and of their animals; giving first the general and then the particular conformation of each organ, and enumerating the Genera and Species to which they respectively belong, principally according to the Linnean system. He thus describes the various peculiarities of the mantle,—with its relations to the colour and form of the shell,—of the operculum, of the foot, and other parts; including under the latter, the structure of the various organs it contains. Mr. Collier concludes his paper with some observations on the different parts of shells, as affording means of classification, and on the natural and artificial arrangements of them; proposing a new system founded on the characters of the shells and of the animals in conjunction; and suggesting the designation of the families by Latin names of one termination. The parts he employs as characteristic are the cavity, lip, columella, rostrum, spire, and some others.

June 3.—A paper was read *On the Generation of Fishes*; by J. L. PREVOST, M.D.

June 17.—Sir E. HOME communicated a paper *On the Organs of Generation of the Axolotl, and of other Protei*: and the Society adjourned, over the long vacation, to meet again on Thursday, November 18.

LINNEAN SOCIETY.

Feb. 3 (*continued*).—A notice by JOHN HOGG, Esq. B.A. of Norton, Durham, was also read, stating that a fine specimen of *Falco chrysaëtos*, or Golden Eagle, was lately shot near the mouth of the Tees; being the fifth known to have been killed in England.

The reading of Mr. VIGORS' extended paper *On the Natural Affinities that connect the Orders and Families of Birds*; likewise occupied the attention of the Society on Feb. 17 and March 2.

March 16.—The reading of Mr. VIGORS' paper was also continued at this meeting; and the following communication was read:

On the insect called Οιστρος by the ancient Greeks, and Asilus by the Romans; by W. S. MACLEAY, Esq. F.L.S. Communicated by the Zoological Club of the Linnean Society. In this paper, which may interest the lovers of Classical Antiquity as well as those of Natural History, Mr. MacLeay has produced many interesting proofs that the *Æstrus* of the ancients,

“ ————— cui nomen *Asilo*
Romanum est, *Æstron* Graii vertère vocantes.” (VIRG. Georg. II.),

was not the insect to which this name is now given; but a *Tabanus*. Olivier first observed that it was different from the *Æstrum* of the moderns. Pliny uses the name *Tabanus* for the Μωψ, which Aristotle says is nearly related to *Æstrus*, both being εμπροςθενκντρx; it cannot therefore be the modern *Æstrus*: he also says that both are bloodsuckers, which agrees with the Linnæan *Tabani*, but is wholly inapplicable to the modern *Æstrus*. As the insect is too well known for its name to have been forgotten or misapplied, there can be little doubt but that the Latin *Tabanus*, Italian *Tabano*, Spanish *Tavano*, and French *Taon*, are identical. Mouffet gives the latter as the same with the English Breese, Clegg, and Clinger, mentioned by Shakspeare, who speaking of Cleopatra, says:

“ The Brize upon her, like a cow in June,
Hoistsail and flies.”

Some elucidation is also derived from Homer, and the Prometheus of Æschylus; and it is observed that Virgil describes the *Asilus* or *Æstrus* as abundant and *acerba sonans*, whereas our *Æstrus bovis* is a rare and silent insect. They were first confounded by Valisnieri, who has been followed by Martyn, and others. Mr. MacLeay infers that Aristotle did not even know the latter, from his assertion that no Dipterous Insect has a sting behind.

April 6.—A letter was read, from the Rev. W. WHITEAR, A.M. F.L.S. of Starston, in Norfolk, stating that a Little Bustard had been shot in December last, at Little Clacton, in Essex. He considers it to be a curious fact that this bird, an inhabitant of a Southern climate should have been met with in this country, in a hard winter.

April 20.—Sir T. GERY CULLUM, Bart. F.R.S. F.L.S. presented some sections of Fir timber, pierced to a great depth by the *Sirex juvencus* of Linnæus; together with specimens of the insect itself. They were from the woods of Henham Hall, in Suffolk, the seat of the Earl of Stradbroke, where two hundred Scotch Firs have been destroyed by this insect; being bored through and through.

A *Catalogue of the Norfolk and Suffolk Birds, with remarks*; by the Rev. REVETT SHEPPARD, A.M. F.L.S. and the Rev. W. WHITEAR, A.M. F.L.S., was read in part.

May 4.—A notice from Mr. WOOD was read, respecting a specimen of the Golden Oriole, *Oriolus Galbula*, shot on the 26th of April, while flying in company with some Blackbirds, at Aldershot, in Hampshire.

The reading was continued of Mr. VIGORS' paper *On the Natural Affinities of Birds*; and of the *Catalogue of Norfolk and Suffolk Birds*, by the Rev. Messrs. SHEPPARD and WHITEAR.

June 1.—The reading of Mr. VIGORS' paper was concluded; and that of Messrs. SHEPPARD and WHITEAR's *Catalogue* continued.

June 15.—The meeting of this evening, which was an extremely numerous one, was honoured by the presence of H. R. H. The Prince of Saxe-Cobourg, and several other personages of distinction.

ALEXANDER MACLEAY, Esq. Sec. L. S. exhibited a curious specimen, showing that two Papiliones, referred to distinct Families by Fabricius, are in reality the Male and Female of the same Species: this specimen presented the forms and colours of both sexes, divided by a longitudinal line on the body; the right wings and side of the body being as in the Male, and the left as in the Female.

The reading was commenced of a paper *On the Structure of the Tunicata*; by W. S. MACLEAY, Esq. A.M. F.L.S.: and the Society then adjourned, over the long vacation, to the Second of November next.

ZOOLOGICAL CLUB OF THE LINNEAN SOCIETY.

IN our former number we had the pleasure of recording the establishment of this Association, and the proceedings of their first, or Anniversary Meeting, on Nov. 29, 1823. The following business has been transacted since that period.

Dec. 9, 1823.—A portion of a paper was read, “On the natural affinities that connect the Orders and Families of Birds,” by N. A. Vigors, Jun. Esq. M. A. F. L. S.

Jan. 13, 1824.—A paper was read “On the Insect called *οιστρος* by the Greeks, and *Asilus* by the Romans,” by W. S. MacLeay, Esq. M. A. F. L. S.

Jan. 27.—A paper entitled “Observations on the *Motacilla Hippolais* of Linnaeus,” by the Rev. Revett Sheppard, M. A. F. L. S. was read.

The reading of Mr. Vigors’ paper “On the Natural Affinities that connect the Orders and Families of Birds” was continued.

Feb. 10.—A paper was read “On the general construction of the wing in Dipterous Insects undergoing coarctate metamorphoses, with a description of some new genera,” by W. S. MacLeay, Esq. M. A. F. L. S.

Feb. 24.—The reading of Mr. Vigors’ paper was continued.

A paper, by J. E. Bichenor, Esq. F. L. S., was read, “On the importance of General Views to the progress of Natural History.”

March 9.—A portion of a paper was read, entitled, “Zoological Observations,” by the Rev. Revett Sheppard, M. A. F. L. S.

A portion of a paper was also read, “On the Insects figured and sculptured on the ancient monuments of Egypt,” by P. A. Latreille, of the Royal Academy of Sciences at Paris,” translated by Mr. E. T. Bennett, F. L. S.

March 23.—The remaining portion was read of the paper entitled “Zoological Observations,” by the Rev. Revett Sheppard, M. A. F. L. S.

April 13.—Mr. Vigors called the attention of the Meeting to two species of Birds, which he exhibited from his collection, new to the Ornithology of the British Islands. The first of these birds

Anthus Richardi of M. Vieillot, was taken alive in a net in the fields, north of London, in the month of *October*, 1812. The second, an undescribed species of *Scolopax*, was shot in Queen's County, in Ireland, on the 21st *August*, 1822. Mr. Vigors proposed to name the latter species *Scolopax Sabini*, in honour of the Chairman of the Club, and he signified his intention of giving a detailed account and description of these Birds at an early opportunity.

Mr. Vigors' paper "On the Natural Affinities that connect the Orders and Families of Birds," was concluded.

April 27.—A paper was read entitled "Descriptions of several species hitherto unpublished, of the Genus *Coccinella*," by Geo. Milne, Esq. F.L.S.

GEOLOGICAL SOCIETY.

Feb. 20.—A notice was read, of the Discovery of a perfect Skeleton of the Fossil Genus hitherto called *Plesiosaurus*; by the Rev. W. D. Conybeare, F.R.S. M.G.S.

The *Plesiosaurus*, which is the subject of this notice, was found in the blue lias of Lyme Regis, in Dorsetshire. In the whole exterior portion of its vertebral column the skeleton is entire, and of the remaining parts of the animal few are wanting. In the Transactions of the Geological Society, vol. v. and vol. i. second series, the author had attempted to assign to the various dispersed and disjointed remains of this animal which were then known, their relative places in the skeleton, and his opinions, he observes, have now, in all essential points, received full confirmation. After pointing out the errors into which he had fallen, Mr. Conybeare describes the osteology of this remarkable fossil animal; the most characteristic and distinguishing features of which are, the extraordinary length of the neck, which fully equals that of the body and tail united, and the number of its vertebræ, which very far exceeds that of any animal previously known.

A notice was also read on the *Megalosaurus*, or great Fossil Lizard of Stonesfield, near Oxford; by the Rev. W. Buckland,

F.R.S. F.L.S. President of the Geological Society, and Professor of Mineralogy and Geology in the University of Oxford, &c. &c.

The author observes that he has been induced to lay before the Society the accompanying representations of various portions of the skeleton of the fossil animal discovered at Stonesfield, in the hope that such persons as possess other parts of this extraordinary reptile may also transmit to the Society, such further information as may lead to a more complete restoration of its osteology. No two bones have yet been discovered in actual contact with one another, excepting a series of the vertebræ. From the analogies of the teeth they may be referred to the order of the *Saurians* or Lizards. From the proportions of the largest specimen of a fossil thigh bone, as compared with the ordinary standard of the Lacertæ, it has been inferred that the length of the animal exceeded forty feet, and its height seven. Professor Buckland has, therefore, assigned to it the name of *Megalosaurus*. The various organic remains which are found associated with this gigantic Lizard form a very interesting and remarkable assemblage. After enumerating these, the author concludes with a description of the plates, and observations on the anatomical structure of such parts of the *Megalosaurus* as have hitherto been discovered.

May 7.—A letter was read from Thomas Botfield, Esq. M.G.S. accompanied by a collection of bones and horns of the Deer, and bones of Man and other animals, found in a clift of the rock, at a quarry at Hinck's Bay, (near the Old Park Iron Works,) in the parish of Dawley, and county of Salop. Their adhesion when applied to the tongue, showed that the animal gelatine was nearly gone, which does not take place till after a long period of inhumation.

ROYAL ACADEMY OF SCIENCES OF PARIS.

January 5, 1824.—M. Gaillon communicated some observations supplementary to his Memoir, *on the Nutritive animals of Oysters.*

January 12.—M. Magendie gave a verbal account of a Memoir, by M. Desmoulins, *on the Composition of the Spinal Marrow*. M. Bailli read a Memoir *on the Use of the Horns of certain Animals, particularly in the Buffalo*.

January 19.—M. Le Gallois jun. deposited a Memoir, written by his father, *on Animal Heat*.

M. Ségalas presented a kidney, converted, by the formation of a number of calculi, into a great membranous sac.

M. Desmoulins commenced reading a Memoir *on the Use of the colours of the Choroid Coat, in the Eyes of vertebrated Animals*.

January 26.—M. Strauss continued the reading of his Memoir, *on the Anatomy of the Cockchaffer*.

M. Desmoulins concluded his Memoir *on the Choroid Coat*.

February 16.—M. Geoffroy presented, in order to prevent anticipation, a table of corresponding nomenclature of the various Bones of the Cranium in vertebrated Animals.

ART. XLI. Scientific Notices.

CHARACTERS OF THE CEBRIONIDÆ.

NORWICH, April 8, 1824.

SIR,

An important error has crept into Dr. Leach's useful Monograph on the Cebriionidæ in the Zoological Journal, which should not, I think, go uncorrected. The Family is stated to be Heteromerous, "Tarsi pedum anteriorum et mediorum, 5-articulati; posteriorum, 4-articulati:" whereas it is Pentamerous, and the description should have been "Tarsi omnes articulis quinque."

I am, Sir,

Yours very obediently,

THOMAS BRIGHTWELL, F.L.S.

J. G. CHILDREN, Esq.

CEBRIONIDÆ.—STIRPS III.

We are indebted to the kindness of another Entomological Friend, for reminding us that Dr. Leach's third Stirps or Family of Cebriionidæ, are the females of the other Stirpes; and that the *Cebrio brevicornis* of Olivier, forming the genus *Hammonia*, has been for some years past, ascertained to be the female of *Cebrio gigas*: see article *Cebrio*, in *Dict. Classique d'Hist. Nat.*

ARANEA DOMESTICA.

SOME years ago, when making some observations on the habits of Spiders, I was struck with the following circumstance, which I have never found in any author on the subject. I insulated a common House Spider, by placing it on a little platform, supported by a stick with a weight at the bottom, in the middle of a rummer of water. The platform was about $\frac{1}{2}$ an inch above the surface, which was nearly even with the top of the glass. It presently made its escape, as was anticipated, by suffering a thread to be wafted to the edge of the glass; but supposing that it might have been assisted by the water being so nearly on the same level, I poured some of it away, and placed the Spider as before. It descended by the stick till it reached the water, and examined with its two anterior feet all round, but finding no way to escape, it returned to the platform, and for some time prepared itself by forming a web, with which it loosely enveloped the abdomen, by means of the hinder legs. It then descended, without the least hesitation, into the water, to the bottom; when I observed the whole of the abdomen covered with a web containing a bubble of air, which I presume was intended for respiration, as it evidently included the spiracles. The Spider enveloped in this little diving bell, endeavoured on every side to make its escape, but in vain, on account of the slipperiness of the glass; and after remaining at the bottom of the water for thirteen minutes, it returned apparently much exhausted, for it immediately coiled itself closely under the little

platform, and remained afterwards without motion. This property of forming for itself a reservoir of air, by means of which it is preserved under water, is somewhat analagous to the interesting habit of the *Argyroneta*, although it serves for a different purpose. In the present case, it is doubtless intended to enable the animal to cross the water with safety. T. B.

AMPHITOÏTE, A FOSSIL OF VEGETABLE ORIGIN.

AMPHITOÏTE was described by M. Desmarest, in 1811, and considered by him, at that time, as forming a particular division in the class of Flexible Polyparia. Many characters concurred to lead him to that opinion, as its ramified and irregular structure; its distinct articulations, and the presence of impressed points on their superior margins, similar to the cells which, in the Polyparia, form the habitation of the animal; but he has since discovered that all these indications are fallacious, and that his Amphitoïte is really of vegetable origin, and referable to a very common marine plant, the *Zostera oceanica* of Linnæus. M. Desmarest proposes therefore to change the appellation of *Amphitoïte*, to that of *Zosterite*.—*Ann. des Sciences Naturelles*, vol. i. p. 331.

HELIX NEMORALIS, A CARNIVOROUS ANIMAL?

March, 1824.

In October or November, 1823, a full grown individual of *Helix nemoralis* was found in a garden in Lambeth, closed up for the winter. In this state it was thrown about by children in a warm room, for a month. Happening to be placed in a garden-pot, it felt the moisture, and soon walked about; but finding no food, it attached itself to the plant, and returned to its torpid state. When disturbed and moistened it was generally revived; but although lettuces, primrose leaves, and at least twenty other plants of very various textures, were presented to it, it refused to

eat : but, after drinking, would return to its winter quarters upon the edge of the pot or leaves of the plant. Each time it closed its aperture it was observed to form a weaker membrane. Fearing it would starve, a fresh supply of vegetables was presented to it, and whilst it was drinking it was closely watched, in the hope of seeing it eat also, when it was observed to lick up the minute portions of wool that had been deposited with the dust in a much frequented room ; this led to the idea of its being a carnivorous animal, and a wounded worm was offered to it, the dead portion of which it immediately nibbled, but did not eat much ; a portion of roasted mutton appeared to be more palatable, for after eating a small part, it retired and closed its shell as usual. In about a week, this now partly domesticated Snail was again roused from its torpor by water, and it fed heartily upon a portion of the mutton that had been allowed to dry, and was sodden with the water. This operation has been repeated at intervals of about a week, and the animal has evidently gained strength ; if roused at shorter intervals it refused to eat.

Should the carnivorous appetite of this species of *Helix* be verified by observations in the summer and open air, it will lead to important considerations respecting the food of the inhabitants not only of Recent but also of Fossil Shells, for we know of no difference between the structure of this animal and that of *H. aspersa*, or *pomatia*, which undoubtedly feed upon leaves. It will also show the necessity of our becoming well acquainted with the habits of what are commonly considered noxious animals before we destroy them.

J. D C. S.

VITALITY OF SPONGES.

SUBSEQUENTLY to the printing of the “ *Remarks on the Animal Nature of Sponges*,” at p. 202 of the present number, the following observations of the celebrated Ellis on their power of contraction and dilatation, have been communicated to the Conductors, by E. W. BRAYLEY, Jun. A.L.S. They are contained in a

paper, "*On the Nature and Formation of Sponges.*" Phil. Trans. vol. lv. p. 280.

After some introductory remarks, adverting to the opinions of the ancients and of Count Marsigli on the nature of Sponges, Mr. Ellis proceeds to quote and controvert Dr. Peysonell's account of the formation of them by "little animals, that walk to and fro in the labyrinth of the tubes to construct his extraordinary animal fabric." In the course of his statement he gives some observations made by himself and Dr. Solander, at Brighthelmstone, on the *Spongia medullam panis referens*, or Crumb of Bread Sponge, and then proceeds as follows: "After this, we proceeded along the sea coast to Little Hampton, near Arundel, on the coast of Sussex, where we took up out of the sea several specimens of the same sort of Sponge full of an orange-coloured gelatinous matter; and, while they were just fresh from the sea, we examined them (after they had rested for some time) in glasses of sea-water; and to our great surprise, instead of seeing any of the polype-like suckers, or any minute animal figure, come out of the papillæ, or small holes with which they are surrounded, *we only observed these holes to contract and dilate themselves.* And as a further confirmation of this motion, being at Hastings, in Sussex, in August, 1764, in company with Dr. Gowin Knight, F.R.S. we collected from the rocks at ebb-tide, just under water, a variety of the same kind of Sponge, but of a pale yellow colour, and in the form of several cocks-combs united together, the tops of which were full of tubular cavities or papillæ: when we examined these in glasses of sea-water, *we could plainly observe these little tubes to receive and pass the water to and fro;* so that the Sponge is an animal *sui generis*, whose mouths are so many holes or ends of branched tubes opening on its surface; with these it receives its nourishment, and by these it discharges, like the polypes, its excrements.

"But, to give a further proof of Sponges sucking in and throwing out the sea-water, I shall quote a passage from that fair investigator of nature, the celebrated Count Marsigli, in his *Histoire Physique de la Mer*, p. 53, who, notwithstanding he took them for

Plants, as well as he did Corals, &c. has in his chapter on Sponges this curious observation, which proves quite the contrary. “ J’ai un fond suffisant de ces plantes pour en faire une botanique entière, & plusieurs reflexions curieuses sur la systole & diastole, que j’ai observées, dans certains petits trous ronds de ces plantes, lors qu’elles sortent de la mer, mouvement qui dure jusqu’ à ce que l’eau soit entièrement consumée.”

PLESIOSAURUS.

OF the Saurian reptiles, the remains of which abound in the secondary strata in this country, the *Plesiosaurus* is unquestionably one of the most interesting ; we are informed that several skeletons of this extraordinary animal have been taken up lately ; one of them in so perfect a state as to enable Mr. Conybeare to determine with a certain degree of precision the general form and characters of the skeleton of the animal : we shall only now mention the great length of its neck, in consequence of the extraordinary number of cervical vertebræ, amounting, perhaps, to forty, a number far exceeding any thing that has hitherto been observed in any class of animals.

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ART. XLII. *An Inquiry into the natural Affinities of the Laniadæ, or Shrikes; preceded by some Observations on the present State of Ornithology in this Country.* By WILLIAM SWAINSON, Esq. F. R. S. F. L. S. M. W. S. &c.

THE very able disquisition on the present state of Ornithological nomenclature, by Mr. Vigors, which appeared in the last number of this Journal, supersedes the necessity of any further observations on those particular points which that gentleman has so well discussed; yet the subject is so much connected with the best interests of science, that I shall preface the present inquiry by a few observations upon the relative state of Botanical and Ornithological knowledge in this country; which may, perhaps, tend to illustrate the truth of the remarks above alluded to, and will not be altogether foreign to the more immediate object of this essay.

It is not too much to say that, generally speaking, Zoological Nomenclature has long usurped the station of Zoological Science. So great, indeed, is the repugnance of British Ornithologists to have their long-cherished notions about *Genera* in any way disturbed, that even the consciousness of our own national inferiority in this study is insufficient to shake their prejudices. This "closing of the mind" against new ideas and new knowledge, is, however, more to be regretted than censured. As years pass over our heads, we cling with delight to the impressions of youth; and

after a certain period, we become unalterably wedded to those doctrines which we first imbibed; which we have long been accustomed to consider as axioms, and to dwell upon with self-complacency. Knowledge will still increase; and the time may come when we ourselves may view, if not with jealousy, yet with coldness and suspicion, the new theories that may hereafter arise, from a more extensive acquaintance with Nature. It is related of Linnæus, that when, in the ardour of youth and science, he came to visit the botanists and gardens of England, on his introduction to the great and venerable Sir Hans Sloane, that distinguished man received the young stranger but coldly; being unwilling, as his biographer states, “to have his botanical creed interrupted, by innovations so totally subversive of the system he had so long cherished; Sir Hans being then in his seventy-eighth year.” If therefore the younger botanists of that age had subscribed to the opinion of this great and good man, and, like him, had settled in their minds that the systems of Ray and Tournefort had displayed all that nature could teach, and that nothing more was to be studied than the characters of new species, neither the names of Jussieu, Smith, Brown, nor Decandolle, with a host of others, would perhaps have been known: nay, not even that of Linnæus himself. His system would have been rejected as presuming to teach more than others, and he himself aspersed as being the greatest innovator on the science he professed to advance. The censure that must have been cast upon the *Systema Naturæ* by the admirers of those systems it intended to supplant, was, no doubt, much greater than what is now bestowed upon the promoters of general views and the institutors of new genera. Yet, in spite of every opposition, the Linnæan system became firmly established; so true it is, that Science can never remain stationary, or the inquiring mind be deterred from searching out fresh springs of knowledge. It is confessed on all sides, that the botanical labours of Linnæus are infinitely more valuable than those which relate to the animal kingdom; yet the former have undergone the greatest change, with little or no opposition, from succeeding botanists; for not one can be named, of any eminence, who has opposed the ad-

mission of new divisions ; and the very disciples of Linnæus have nearly doubled the number of genera contained in the early editions of their master's system. Let us look a little at the consequences that have followed. A very large proportion of those eminent botanists who have flourished since the time of Linnæus, have been natives of England. While, in our own days, we can boast of one whose eminent superiority is acknowledged throughout Europe. Such, in Botany, has been the consequence of acting on the *spirit*, and not on the *letter*, of the *Systema Naturæ*.

We will now consider how far the study of Ornithology has kept pace with that of Botany. This portion of the Linnæan arrangement is acknowledged to be imperfect ; yet it has unfortunately happened, that no one of his disciples, possessing a vigorous and comprehensive mind, has ventured to carry on the work of improvement, by following the example set them by their great master. Linnæus, in every succeeding edition of his works, increased the number of his genera, and amended the descriptions of the species. And it is somewhat singular, that in one of the last essays with which he enriched science, are contained the characters of two new genera ; as if, by this act, he intended leaving us an example to alter and improve our systems, as our knowledge of Nature becomes more extended. But no : English Ornithologists, since that day, have fancied that they could not show greater respect to the memory of Linnæus, than by guarding his system against all amendment or improvement : thus they have gone on, overloading all the old genera with hosts of birds they were never intended to contain ; until, at length, the whole system is become an inextricable labyrinth, in a great measure useless, either for scientific or practical purposes. It resembles one of those beautiful trees I have seen in the forests of America, on which the seeds of different parasitic plants have been casually deposited : these take root, and gradually spread from branch to branch, until the whole becomes one undistinguishable mass. The proportions of the parent tree are no longer seen ; and, overloaded by vegetation, not originally its own, it falls to the ground a heap of ruins.

This may appear an exaggerated picture, but I will appeal to any Ornithologist, engaged in the study of species, for its truth. I will appeal to the well-known fact, that the same bird is frequently described under two or more different genera in our popular systems; and to the constant exposure of their defects by continental writers. I will even cite a case in point. The peculiar structure of the tongue, in the genus *Meliphaga* of Lewen, is well known to most Naturalists: it is formed like a brush, the filaments at the end are tubular, and adapted for sucking the nectar of flowers: all the species, moreover, are natives of New Holland; they are, in short, as distinct a genus as can well be imagined. Yet, it is not a *Linnean* genus; and therefore, if a student wishes to ascertain the name of a species, in Dr. Latham's General Synopsis of Birds, or in Shaw's Zoology, he must read the descriptions of several hundred birds arranged in the genera *Turdus*, *Certhia*, *Merops*, and *Sylvia*, before he can possibly ascertain one species: for the genus itself is altogether rejected as an innovation.

It is a painful and an ungracious task to animadvert on the works of our contemporaries; but we must speak plainly, when we see attempts made to bring us back to the infancy of the science, by the publication of systems, new indeed from the press,—but obsolete in their ideas and language.

While Botany, therefore, has been progressively advancing, Ornithology has remained nearly stationary. Our elementary books and our voluminous systems, as Mr. Vigors truly observes, speak the language of a remote period; and display a lamentable picture of our Zoological proficiency to the rest of Europe. Better indeed had there been no such terms as *Order* and *Genus*, for they have acted like a magical spell, upon minds that otherwise perhaps might have burst the trammels of nomenclature, and like Linnæus, have “dared think for themselves.”

I may perhaps be censured for giving such a humiliating picture of our Ornithological knowledge, and I should have had some hesitation in drawing it, did I not see among our rising Naturalists, some whose talents and whose zeal will not only redeem the past, but take a much higher view of the science than has hitherto

been done in this, or any other country. Ornithology is neither a study of names, nor of feathers ; it neither consists in giving to a bird a name, nor in describing the colours of its plumage : but rather teaches us to enquire what place it occupies in creation ; what functions it is destined by Almighty Wisdom to perform ; how its organization corresponds to these functions ; and lastly, its various relations to other animated beings.

It is to facilitate such enquiries, which shed a ray of dignity and importance on the study of Nature, hitherto obscured by the mistaken zeal of nomenclators, that I have put together the following observations. Whatever errors they may contain I feel confident will meet with most indulgence from those who are best able to understand the difficulty of the undertaking. It is a new and intricate field of enquiry ; which, to the honor of Britain, has been opened to us by one of her sons ;* but is nevertheless attended with peculiar embarrassments to English Naturalists, from the acknowledged poverty of our Public Collections, and the total want of Zoological instruction,† which our students have to contend against. Let us hope these deficiencies, which have now become a national reproach, will be soon supplied by a wise legislature.

LANIANÆ.

The Shrikes present so many characters analogous to the *Falconidæ*, or true birds of prey, that the most eminent Naturalists have disagreed as to their true situation. By Ray they are placed with the *Accipitres* ; and this example was followed by Linnæus. On the other hand Brisson considered them as more closely allied to the Thrushes. The opinion of M. Temminck has fluctuated ; for in the first edition of the *Manuel d'Ornithologie*, this Natural-

* I need hardly explain, that I here allude to the profound observations contained in the *Horæ Entomologiæ* of Mr. William S. MacLeay.

† Well may the foreigner who beholds our learned establishments, so splendidly endowed, note, among the most remarkable circumstances attending them, that in none whatever should there be a Zoological chair.—*Hor. Ent.* 2 p. 456. note.

ist has followed the classification of Ray ; but in the second, he adopts that of Brisson, by placing the Shrikes and Thrushes in the same order.

The *Laniæ* are Falcons of the Insect world, pursuing and destroying vast numbers of those countless multitudes that swarm in tropical countries. Some of these birds are so fierce and cruel as to destroy from mere wantonness ; and have been called Butcher-birds, from their singular habit of impaling their victims on thorns and cleft branches, where they are left to be devoured at leisure. It is this particular group, preeminent in strength to all the other Linnæan Shrikes, that may be considered the type of the whole family : they are distinguished by a short, arched bill, furnished with a strong projecting tooth near the tip ; which is acute, and altogether very analogous to the true Falcons. To these birds we shall restrict the genus *Lanius*, and taking the *Lanius excubitor* of Linnæus for the type, proceed to notice what other birds will most approximate to this form ; first observing, that they are found to inhabit the temperate latitudes of the old and the new world.

I am as yet unacquainted with any species of *Lanius* from Australasia, and am therefore led to believe, that its situation is filled in that fifth division of the globe, by the genus *Falcunculus* of M. Vieillot ; the Frontal Shrike is the only example of this type we yet know of. It is distinguished from *Lanius* by having longer and more pointed wings, and an even tail, both indicating a greater power of flight, and in consequence, some difference of economy. Another deviation from *Lanius* may be seen in the *Sourcirou* of M. Le Vaillant, introduced in the *Ois. d'Afrique*, (2. pl. 76. f. 2.) though in reality a native of America ; it is the *Tanagra Guianensis* of Latham, and it is remarkable for its round, naked nostrils, and the tooth of its bill being nearly obsolete ; it has the wings of *Lanius*, and the tail of *Falcunculus* ; this type I have called *Cyclarhis*.* I am unacquainted with any other kindred birds from the new world ; while of the African types (which appear numerous and interesting) I have seen but few : judging from the figures contained in the *Oiseaux d'Afrique*, I should think it

* The characters of such new Genera as may be proposed, will be given in the next number, accompanied by figures of their bills, &c.

probable that the passage from the short-billed Shrikes to *Thamnophilus*, Vieil. will take place among the birds of that continent.

Two species, recently published by M. Temminck (*Pl. Col. pl.* 256.) seem to warrant this belief: for in the figure of *Lanius personatus*, Tem. we see the straight bill of *Thamnophilus*, with the cuneated tail of *Lanius*; while in that of *Lanius virgatus* we see the lengthened bill, and truncated tail, of *Thamnophilus*. M. Temminck has not noticed this affinity; but on the contrary believes this last bird will lead us immediately to the *Muscicapidæ*.* *Nous donnons cette espèce nouvelle comme pouvant servir de type à une section du genre Lanius, intermédiaire ou indiquante le passage qui, des Pie-grièches, conduit au genre Muscicapa de Linné. La force et la longueur du bec, en rapport de la petite stature, ne permettent point d'associer cette espèce et celles qui lui ressemblent plus ou moins avec les oiseaux donnés comme type des vrais Gobe-mouches, et moins encore avec le moucherolles.* M. Temminck judiciously goes on to observe, that the square form of the tail constitutes a marked difference from the European *Laniidæ*; this is true, but we find that a square, or even tail, is universal among the African *Thamnophili*; while *la force et la longueur du bec*, is the peculiar character of that family. M. Temminck very clearly proves that this bird has no connection either with the genus *Muscicapa* or *Muscipeta*; but has not informed us to which particular group of the *Muscicapidæ* it really indicates a passage; neither can I possibly conjecture where this group is to be found. On the whole, I am therefore more inclined to believe, from a review of the above argument, that the *Lanius virgatus* will offer no immediate transition to the *Muscicapidæ*, but rather will represent one of those forms by which we shall quit the short-billed rapacious Shrikes, and enter upon the insectivorous *Thamnophili*. I wish, nevertheless, that the reader should bear in mind that this opinion is not formed from an actual examination of the bird, but solely from the remarks of M. Temminck, which I have already quoted. That this bird will constitute a distinct type, appears evident from the confession of this celebrated ornithologist; but he has neither de-

* It is necessary to quote this passage, because the real situation of this bird is important.

tailed its essential character, nor given us any idea of what other birds we are to associate with it.

There is still another African *Lanius*, which departs so much from the type of this particular group, as to strengthen our belief of its being intimately connected with the *Thamnophilinæ*. The bird I allude to, is the *Bru-bru* of Le Vaillant, or *Lanius capensis* of Gmelin; here the back or culmen of the beak is curved, the tip considerably bent, (but not abruptly hooked,) and the sides strongly toothed: so far we have the indications of a true *Lanius*; yet in the more slender and lengthened form of both mandibles, and in its short and even tail, we may detect an evident approximation to the *Thamnophili*. This affinity is in some measure confirmed, by its economy being so very similar to those birds, as to induce M. Le Vaillant to place them in the same section. Africa appears to be the favourite country of the *Laniianæ*, but the materials I have been enabled to consult are so scanty, that I am debarred from pursuing this part of my inquiries further. Enough however has been said, to prove that the last two birds we have particularly noticed, will bring us very close to the division we shall call

THAMNOPHILINÆ.

The group we are now to consider, is eminently distinguished from the last, by the prolonged form of the bill, which is strong, compressed, and straight nearly to the tip of the upper mandible, which terminates in an abrupt hook: the tooth, so conspicuous in the last family, is here much smaller, and assumes the appearance of a deep notch: all these peculiarities indicate an inferiority of strength and a consequent difference of economy. The shortness of their wings, and the comparative weakness of their tarsi, show that neither of these organs are much employed in securing their prey. Their manners in fact are very opposite to those of the rapacious *Laniianæ*, for they are found only among thick bushes, feeding upon caterpillars and other small creeping insects, which, concealed among the foliage, escape the notice of the true Shrikes; while, to keep up the chain of affinity—we find they inherit somewhat of a rapacious disposition, by occasionally feeding upon

young or sickly birds, which take refuge in their haunts. The *Thamnophilinæ* are confined to the tropical latitudes of America, Africa, and probably Asia.*

M. Vieillot first distinguished the long-billed Shrikes of Africa and America by the generic name of *Thamnophilus*,† and in his last work has figured the *Pic-grièche blanchot* of Le Vaillant, as the type. It is important, however, that we should separate the African *Thamnophili*, from those of the new world; because we shall presently attempt to show, that they both lead to different groups; and because a peculiar distinction will be observed between them; the lateral scales on the tarsi of the African species, are formed of entire laminæ, while, in those from America, they are small and very numerous; in the first, the *rietus* is strongly bearded, in the last it is smooth.‡ The name of M. Vieillot I shall therefore confine to such species as inhabit America, agreeably to the plan adopted by M. Temminck; while those of Africa will form the Genus *Malaconotus*, and may be represented by the *T. olivaceus* of M. Vieillot. But we must leave these for the present, and notice another remarkable form seen in the genus *Vanga*, Vieil., of which two species are known, one described as a native of Madagascar, and the other inhabiting Australasia: these birds have all the indications of being rapacious, or feeding upon small animals, as well as insects, and in this respect assimilating to the Shrikes; yet the bill is decidedly formed upon the same model as that of *Thamnophilus*; it is long and straight, with an abrupt and very sharp hook, which must be a powerful weapon in destroying their prey: the nostrils are very peculiar, and are pierced in the hard substance of the bill, in a similar manner to *Cassicus*, *Ba-*

* I am unacquainted with any birds from Australasia that can be referred to the genus *Thamnophilus* of M. Vieillot; yet there is an unknown species in my collection, which, from the peculiar length of its wings, its even tail, and its general *habit*, belongs neither to the African nor American types. Reasoning from theory, I should suppose it to come from Australasia, in which case it will present a beautiful analogy to the long wings and even tail of *Falcunculus*.

† I may here observe that M. Temminck, in adopting this genus, confines it to the species found in America alone; yet I am quite at a loss to know, from the *Manuel d'Ornithologie*, where the African species are arranged.

‡ The tarsi of the African species are also much stronger.

rita, and some other groups ; but this resemblance is merely analogous, as the whole *habit* of the bird is evidently rapacious ; while the structure of the bill is so characteristic of the *Thamnophilinae* that I am disposed to consider *Vanga* as the type of the whole family. May not the *Lanius virgatus*, T. which we have already noticed, be nearly related to this type ? At present, *Vanga* appears more isolated than any group we have hitherto considered.

Closely connected with *Malaconotus*, is that singular African bird, called by Le Vaillant *Le Geoffroy*, and forming the genus *Prionops* of M. Vieillot. Its peculiarity consists in having the base of the bill concealed by a semi-circular crest of stiff, setaceous feathers ; which completely cover the nostrils, over which they are directed ; the wings also are more than usually long. Here I suspect we shall detect an affinity to *Dicrurus*,* whose nostrils are invariably defended by stiff incurved bristles, and whose wings are much longer than those of *Malaconotus* ; this affinity seems to be strengthened by the plumage of *Prionops* having a metallic lustre, and the bristles at the rictus, (like those in *Dicrurus*) being remarkably long.

I feel considerable difficulty in assigning a station to the genus *Laniarius* of M. Vieillot, the type of which is the *Lanius Barbarus*, L. or Barbary Shrike of English writers. I notice it in this place, because if it is eventually included in the family of *Laniadae*, its situation, undoubtedly, will be among the *Thamnophilinae*. To these birds it is allied in general habit ; its wings are short and feeble, its tail slightly rounded, though somewhat more lengthened ; its plumage thick, soft, and lax, and the feathers on the lower part of the back particularly long. All these characters present a strong resemblance to *Thamnophilus* and *Malaconotus* ; but in the bill, we see a marked difference ; its structure is considerably weaker ; it is deprived of the strong hook so conspicuous in these genera, and we are, in fact, presented with a form altogether resembling that of the *Meruladae* : this resemblance further

* I adopt M. Vieillot's name for this group, in preference to that of *Edolius*, as proposed by M. Cuvier, because it has the unquestionable right of priority ; setting aside its peculiar excellence in expressing a character which pervades the whole genus.

extends to the form of the *nares*, and the lengthened and robust tarsi. When these perplexing difficulties occur, and we are in doubt as to the situation of a bird, uniting in itself characters of two distinct tribes, our decision must always be regulated by its natural economy. Yet in the present instance, this is somewhat difficult; for the statements before us are meagre and contradictory; M. Vieillot, when describing another species of this type, (*Laniarius viridis*,) observes, probably on the authority of Perrien, (whose book I have no means of consulting,) *Elle se tient dans les bois les plus fourrés, à la cime des grands arbres, où le mâle fait entendre un sifflet fort, qui a quelque rapport avec celui de la caille d'Europe. On l'approche difficilement, si on n'imité sa voix; car il est d'un naturel sauvage et très défiant. Les baies sont sa nourriture principale.*—Galerie des Oiseaux, Liv. 43. pl. 143. On this passage I must make two remarks; relying on the accuracy of M. Vieillot, in associating this bird with the Barbary shrike, which indeed, (judging from the figure) it very much resembles. 1st, The wings of the African *Malaconotus*, like those of *Laniarius barbarus*, are rounded, and very weak; and we shall quote the opinion of M. Le Vaillant, to show the importance of this structure, when connected with their economy. “*Ces caracteres de la coupe de l'aile influant beaucoup sur la maniere de voler des oiseaux, ceux-ci ne se rencontrent que très-rarement sur le sommet des arbres, où nous avons fait remarquer que les pie-grièches de la première section, (G. Lanius, nob.) se perchoient toujours de préférence; il est même des espèces dans cette seconde division, (G. Malaconotus nob.) que la nature exclut entièrement de dessus les arbres élevés, elles cherchent leur nourriture parmi les buissons bas et touffus, dans le centre desquels elles se cachent soigneusement, et vivent principalement de chenilles de vers et de toutes sortes d'insectes. La faiblesse de leurs ailes leur interdit toute espèce d'insectes.*”

I have given this passage at length, because it acquaints us with the true economy of the *Malaconoti*, and at the same time proves the incapacity of *Laniarius* to frequent the tops of lofty trees. On the second part of M. Vieillot's statement, it may be observed, that if the principal food of *Laniarius viridis* be berries, it cannot belong to a tribe so truly insectivorous as the *Laniadæ*, but

rather to the *Meruladæ*, which are both insectivorous and baccivorous. The Barbary shrike we know, on the testimony of M. Le Vaillant, feeds entirely upon insects.

We shall discover a further resemblance between *Laniarius barbarus*, and the African Shining Thrushes, (*G. Lamprotornis*, Tem.), by certain setaceous hairs or weak bristles, seated, in both genera, on the upper part of the neck adjoining the occiput; but which are so hid, as not to be distinctly seen without raising the surrounding feathers, whose length they generally exceed; these singular appendages are not, however, peculiar to the above genera, but are more or less distinguishable in several others, and are remarkably developed in the genus *Tricophorus* of M. Temminck.

I have dwelled more particularly upon *Laniarius*, because a good deal will depend upon the situation which Naturalists may agree in assigning to it. For if this genus be admitted into the circle of *Thamnophilinæ*, it becomes obvious we establish a passage which leads directly to the *Meruladæ*; or as Mr. MacLeay would perhaps express it, the great circles of *Laniadæ* and *Meruladæ* might here probably touch. While, on the other hand, if the affinity between *Prionops* and *Dicrurus* be admitted, we may pass, by the former genus, from the family of *Thamnophilinæ* to the third great division of Shrikes, which will hereafter be noticed.

We must now return to the American types of this division, beginning with the genus *Thamnophilus*, which, I have already observed, will comprise such only of the *Thamnophili* of M. Vieillot as are natives of the new world. Of these birds, I possess a very interesting series, which pass so insensibly by several intervening forms into the true *Myothera* of Illiger, that I scarcely know where to draw a line between such as should take their station in the great circle of *Laniadæ*, and such as more properly may be associated with *Myothera*, in the adjoining circle of *Meruladæ*. This close affinity has been always remarked by the two eminent Ornithologists whose labours we so often advert to; and I should have been more satisfied had this intricate part of my subject already occupied their attention. Both these Naturalists are in charge of superb national museums, enriched by the spoils of English collections (which have been successively disposed

of by sale), and by the labours of public collectors sent to all parts of the world. With such enviable means, therefore, of advancing the philosophy of the science, let us hope they will bestow less attention upon *species*; and more on the study of affinities, and those general laws of Nature which claim the primary attention of a philosophic mind.

I must therefore be understood, in the following remarks, as speaking only of the American birds; for I have not yet seen any of the Indian *Myotheræ** of M. Temminck, nor am I acquainted with any species either from Africa or Australasia.

The type of *Thamnophilus* may be represented by the *Lanius doliatus* of Linnæus; and the characters by which it is separated from the African genus *Malaconotus*, have already been noticed. The bills of the larger species are strong and powerful, particularly the under mandible, which is deeply notched, and the gonix is considerably curved: it is in this organ that all the strength of the bird is concentrated; for the wings are short and rounded, the tail cuneated, narrow and weak, and the tarsi and claws much weaker than in *Malaconotus*. As we descend to the smaller species, the strength of the bill, and the size of the bird, are proportionably diminished; yet without any change of structure. It is at this stage of our progression that I propose to fix the limits of *Thamnophilus*, and pass into the genus *Formicivora*: here the bill is no longer robust; but narrow, slender, and more cylindrical; the under mandible weak, and the gonix nearly strait; the tail of some species is even longer and more cuneated than in the last group; but, as we proceed in the series of species, it becomes gradually shorter, while the tarsi are proportionably lengthened, until we come to a third type of form, wherein the

* M. Temminck has given a very extensive latitude to this genus, which was originally instituted by Illiger, from the *Turdus colma* (Pl. Enl. 821), a South American bird. In the *Manuel d' Ornithologie*, it is stated, "Toutes les espèces sont de l'Amérique Meridionale;" nevertheless, we find that *Myothera capistrata* and *M. melanothorax* of the *Planches colorées* (Pl. 185) are both natives of Java. As the original genus has thus been so much changed, in order to contain other approximatory types, it is here necessary, for the sake of perspicuity, to apply the name only in reference to the type originally proposed by Illiger.

tail is nearly obsolete, and the legs (from their great length), evidently show we have reached a group of cursorial or ambulating birds, who rarely, if ever, frequent trees. These I shall call *Urotomus*. Finally, there seems to be another group, wherein the tail is again developed; the tarsi are proportionably long, but more robust; and the whole habit shows a much greater analogy to the *Meruladæ*, than any of the foregoing types: these birds I shall, for the present, consider as forming the genus *Drymophila*. Whether they should precede or follow *Urotomus*, in our advance towards the *Myotheræ* of Illiger; or whether they will partially bring us back (by a circular disposition of the other types) to *Thamnophilus*, are questions which must be decided by others, whose cabinets are better stored with materials for ascertaining these points. At all events, either *Urotomus* or *Drymophila* will conduct us very close to *Turdus Colma*, the bird which forms the original type of Illiger's genus *Myothera*.

Having now enumerated all the South American types I have seen which intervene between *Thamnophilus* and *Myothera*, I must postpone the investigation of such other kindred groups as may be found to inhabit Africa, India, or Australasia. The Indian *Myotheræ* of M. Temminck seem to differ so little from my group *Formicivora*, that they may, possibly, be united together; while the interval between the long-tailed *Drymophilæ* and the true *Myotheræ*, may perhaps be filled up either by American species I have not yet seen, or by certain African birds, only known to me by the figures of Le Vaillant. But this is conjecture, and indeed belongs not to our present inquiry, which is more to ascertain what groups really constitute the circle of *Laniadæ*, than to trace their ramifications into other tribes. In the two we have already investigated, namely, *Lanianæ* and *Thamnophilinæ*, there evidently seems a double affinity: one, by which they themselves are united, and which may be termed a *family* affinity; and another, by which they branch off, by different routes, into the neighbouring family of *Meruladæ*, and may therefore be called collateral.

These two affinities are particularly observable among the *Thamnophilinæ*. Whether the different changes of form, by which we see these transitions are effected, be called genera, subgenera,

or divisions, is of no consequence whatever to the science itself, for it is a mere question of nomenclature. We see that these forms do actually exist in Nature, and that they indicate a change or modification of economy ; and by whatever name we call them, still they must be kept distinct in our ideas, if we wish to study natural affinities, and the operations of Providence in preserving the harmony of creation.

Referring to what we have already said, when noticing the genus *Prionops*, we shall make use of that type to conduct us to the third family of these birds,

EDOLIANÆ.

It is to M. Le Vaillant that we were first indebted for a knowledge of the habits and economy of certain African birds, which he brought together under the common appellation of Drongos. Yet the ill-directed zeal for nomenclature among our Linnæan writers, prompted them to pass over the opinions of this accurate observer of Nature ; and, up to this day, we find the species confusedly mixed, in their systems, with the Shrikes and Flycatchers. The Drongos first found a place in systematic arrangement, in the Nouvelle Ornithologie of M. Vieillot ; who has given them the name of *Dicrurus*, from the tail, in nearly all the species, being considerably forked ; in the following year they appeared in the Regne Animal, as the genus *Edolius*. Guided by the impartial rule of priority, I shall speak of these birds under the first of these names.

The *Dicruri* are altogether excluded from the American continent ; they are met with in India, but are chiefly found in Africa, where M. Le Vaillant discovered a great number of species, and has given their history at some length, accompanied by numerous figures, in his valuable work *Les Oiseaux d'Afrique*. We find they are insectivorous, and take their prey on the wing : these habits are in perfect harmony with their structure : the wings are longer, more pointed, and consequently more powerful than in the *Thamnophilinæ*. Their bill is short, strong, and arched above, as in the true Shrikes ; but, (as suited to their particular mode of feeding)

the base is broad, and surrounded by stiff bristles; the nostrils are also defended in the same way, and are often completely hid; further, the tooth, which is so conspicuous in *Lanius*, and is still prominent in *Thamnophilus*, altogether disappears in the *Drongos*; and the upper mandible is merely furnished with a notch to receive the point of the under, as in all the tribes of *Muscicapidæ*; the feet are remarkably short, and are useless either for perching upon the ground, or seizing their prey: the soles are flat, and plainly show that these birds can only repose upon branches, like the *Meropidæ*, and others, whose deeply-forked tails indicate a powerful flight. In short, the *Drongos* present us with the first advance, among the *Laniadæ*, towards the general structure and economy of the *Muscicapidæ*, and by considering them as forming the third great division of the Shrikes, we at once reconcile the arrangement of Linnæus with the opinions of the most eminent naturalists of the present day.

The type of this family will not however be found in the genus *Dicrurus*, but in that singular and rare bird called, by Le Vaillant, *Bec-de-fer*; and first described in the *Oiseaux d'Afrique* as having been brought from some island in the Pacific Ocean. It once graced an English museum, but now enriches that of the French capital. I can therefore only judge of its structure from the figure and description of Le Vaillant; from these it appears to be a strong, robust bird; having a short, arched, and gradually hooked bill, formed on the same model as that of *Dicrurus*, but much more powerful; defended at the rictus by long stiff bristles, and over the nostrils by lengthened, elevated, and incurved setaceous feathers, forming a sort of crest, precisely similar to what is seen in one or two species of *Dicruri*, figured by Le Vaillant. This bird forms the genus *Sparactes* of modern authors, and at present stands by itself as our second division of the group of *Edolianæ*.

But before leaving the genus *Dicrurus*, it may be proper to notice several forms by which it is insensibly connected to the short-legged Thrushes of India and Africa: this passage is begun by the genus *Tricophorus* of M. Temminck; where the bill, although somewhat weaker, still retains a great resemblance to that of the *Drongos*; the rictus is likewise strongly bearded, and

the tarsi equally short ; but the tail is even, or slightly rounded ; while the setaceous hairs, which we have before alluded to as being concealed among the nuchal feathers in *Dicrurus*, are very conspicuously developed in *Tricophorus*, and are more than double the length of the surrounding feathers. A singular uniformity of plumage runs through all the species, of which I possess four or five, all received from the western coast of Africa. This apparently limited *habitat* is likewise noticed by M. Temminck, who particularly says, *toutes sont des côtes occidentales d'Afrique*.

In some species the bill is smaller, the nuchal bristles less conspicuous, and those of the rictus much shorter. We are thus prepared for the transition, which here takes place, into the genus *Brachypus*,* a name by which I propose to distinguish the short-legged Thrushes of Linnæus and of modern writers. These birds are exclusively confined to Africa and India, and are so strikingly distinguished from the true Thrushes, that it is somewhat singular their peculiarities should not have been noticed long ago. Their tarsi are remarkably short, like the two last genera ; but their bills are weaker, and the nuchal bristles scarcely perceptible. In short, it is in this genus that all the habits of the *Edolianæ* gradually disappear ; and bring us to a small group of genuine Thrushes, found in Africa, having lengthened tarsi, a graduated tail, and other characters assimilating to the *Meruladæ*, all of which are seen in the *Turdus vociferans*.—*Zool. Ill.* 3. pl. 180.

It thus appears, that not only the *Thamnophilinæ*, but likewise the *Edolianæ*, will lead us by different paths to the great tribe of *Meruladæ* ; the first by means of the *Myotheræ* of authors, and the latter by the genus *Brachypus*.

Leaving these collateral affinities, let us now consider what other birds may be associated with the genuine types of the *Edolianæ*. Here we are met by the genus *Irena*, a name given by Dr. Horsfield to a very beautiful and rare bird, discovered by that naturalist in the island of Java. As this form is only known to me by the figure and description that has appeared of it in the "Zoological Researches," of its discoverer, I must refer the

* Le Courge, *Vail.* pl. 107. f. 1.; Le Cudor, *Ib.* f. 2.; Le Brunoir, *Ib.* pl. 106. f. 1. &c. &c.

reader to that work, where its characters are detailed with Dr. Horsfield's usual precision. It is enough in this place to state, that *Irena* differs more immediately from the Drongos, by having an even tail; while its relationship to those birds is shown in its strong and arched bill, bristly rictus, and very short feet. M. Temminck, whose peculiar tenets on the subject of *genera* have been so ably answered and refuted by Mr. Vigors, will not permit *Irena* to form a genus; because it is nearly related to *Dicrurus* (*Edolius*. Tem.); and he has actually placed it in that genus. No further proof of this affinity, therefore, need be urged; while the perusal of Dr. Horsfield's description (the accuracy of which has not been questioned) will fully establish a sufficient distinction between the two types.

The genuine Drongos appear totally excluded from Australasia; yet we find they are beautifully represented in the Ornithology of that country, by the Carinated Flycatcher. (*Zool. Ill. vol. 3. pl. 147*). This bird will in all probability form a distinct type; allied to *Dicrurus* in general habit, and to *Irena* by its truncated or even tail. I confess, that at the time of my first describing the bird, this affinity did not occur to me. I then placed it conditionally among the *Muscicapidae*, detailing those characters which will now form its generic distinction. At present we know but of one species, but I have little doubt many others will be discovered when the inland productions of that vast country are better known.

It is here most probably that we should notice *Artamus** (Vieil.) a remarkable genus of birds from Australasia. The structure of their bill is evidently a modification of the form seen in *Dicrurus*, and will therefore bring them into the same family. Yet the extraordinary length of their wings (which in proportion and structure

* M. Vieillot first distinguished these birds by the generic name of *Artamus*, in 1816, (See *Analyse d'une Nouvelle Ornithologie Elementaire*, p. 41). In the following year was published the *Regne Animal*, where they appear as the genus *Ocypterus*. M. Temminck adopts this name. Dr. Horsfield, apparently not aware of the prior denomination of M. Vieillot, proposes *Leptopteryx*, justly observing that a genus *Ocyptera* has been already established in Entomology, by M. Latreille, in the *Genera Insectorum*, published in 1809.

resemble those of the *Hirundinidæ*), leaves me in considerable doubt as to the exact situation of this singular group.

I must again refer to the Zoological Illustrations for another bird which is nearly allied to *Dicrurus*, and whose natural station is of considerable importance to our present views; this is the *Muscipeta labrosa* (Vol. 3. pl. 179), a rare bird from the interior of Southern Africa. Unfortunately, I cannot now re-examine the specimen from which my former figure and description was taken, as it was transmitted, soon after, to one of the continental museums. Yet the particulars I then detailed will materially guide us on this occasion. It appears to have a thick and strong bill, the four outer quill-feathers graduated, the tarsi very short, the knees feathered, and the plumage black with a metallic lustre. We here recognize the general characters of *Dicrurus*; while the rounded shape of the tail, the form of the *nares*, and the absence of strong bristles at the bill, show a decided approximation towards another family of insectivorous birds. In short, so closely does the *Muscipeta labrosa* approach to the Echenilleurs of M. Le Vaillant (*G. Cebblepyris*, *Cuv.*) that at this distance of time, I almost question whether I might not have overlooked the spinelike feathers on the back, by which those birds are so well distinguished. Yet, even admitting this to be the case, still its connection with *Dicrurus* is sufficiently obvious, to be adduced as a proof of the accurate views of M. Le Vaillant; who places the Echenilleurs close to the Drongos, and in which arrangement he is followed by M. Temminck. I shall therefore not greatly err in adopting the same belief, and in supposing that the *Muscipeta labrosa* may probably represent a form by which these two groups are connected.

Having now enumerated all the types of form I have yet seen, which may be referred to the *Edolianæ*, I hope to continue the subject in the next number of this Journal, and to show that the Echenilleurs, most probably, will represent the fourth division in the great family of *Laniadæ*.

[To be continued.]

ART. XLIII.—*Sketches in Ornithology; or, Observations on the leading Affinities of some of the more extensive groups of Birds.* By N. A. VIGORS, jun. Esq. A. M. F. L. S.

In a science, which, like Natural History, is founded upon facts, and which is indebted to actual observation for the most important of its materials, it is evidently more conducive to its advancement to exhibit occasionally the progress which it has made, than to delay in fruitless expectation of being enabled to exhibit it in perfection. Every day's experience convinces us of the exhaustless nature of the sources from whence our information is derived, and the impracticability of completing our acquaintance with even a single family or genus. In the very groups where we fancy our knowledge to be most perfect, we find new species coming in, new modifications of form springing up, and new inferences deducible from them, which still call for additional attention; and these arising not only from foreign sources, but from those immediately around us. A faint outline even of those groups which appear most within our observation is the utmost we can hope to delineate. And to withhold our discoveries upon what has actually come before us, in order to add all that may hereafter throw light upon the subject, to wait in short for perfection, is to linger, like the countryman in Horace,—*dum defluat amnis*,—in idle expectation that the stream of Nature will pass by, and the sources of our information be exhausted.

It is in this point of view that a journal, like the present, appears eminently useful to science. It affords a channel through which the Naturalist is able to diffuse the current information of the day: giving instant circulation to every useful discovery as it arises, and every interesting fact as it becomes known. Through such a medium the inquirer into nature has an opportunity of stating the results of his researches as he advances; correcting his errors as he detects them, and confirming or annulling his previous conjectures as he finds them corroborated or falsified by experience. The concurrent observations of contemporary writers

are by these means brought together; and the scattered information of every country is concentrated into one common repository. While publications of more ostensible pretensions slowly deal out the more finished and elaborate productions of science, a journal, continually at work, becomes a storehouse that furnishes them with materials for their labours, and at the same time keeps alive the spirit of inquiry in general, by a constant and regular supply of interesting intelligence.

Conceiving such beneficial results to be likely to arise from a publication like the present, I shall beg leave to offer through its pages a few imperfect observations on some groups in Ornithology. I call them imperfect with unaffected sincerity. Any attempt to enter into the details of such groups under the unfavourable circumstances that attend the pursuit of natural history at present in this country must necessarily be imperfect. We are not only unsupplied with that indispensable information respecting their internal anatomy, and their characteristick manners, which forms the groundwork of zoological science, and which is equally a *desideratum* with all, but we are even deficient in those subjects for observation, which our contemporaries on the Continent possess in superabundance. It is an extraordinary fact, that although this country held the almost exclusive command over the greater portion of the globe, for a considerable period of the last and present century, and with it the equally exclusive power of appropriating to ourselves the productions of nature that thus lay within our reach, so much were those opportunities neglected, or rather so much was the importance of such researches undervalued, that we are far behind our continental neighbours, in despite of all the disadvantages of exclusion under which they laboured so long, in the accumulation of those stores, which are necessary to the advancement of zoology. How far this is the case may be judged from the single fact, that, of a family on which I am about to offer some observations in the present number, and which extends to above three hundred described species,* not a sixth part is to be consulted in the national re-

* It has been suggested to me by a friend, that the observations I made in the last Number of this Journal respecting the number of species described

pository of this kingdom. The zeal and love of science of individuals have indeed added considerably to the materials that are open to the student ; and the liberality of scientific men in general affords every facility to the researches of those who would be likely to profit by the inspection of their collections. But still many impediments lie in the way of him who founds his views in zoology, chiefly on the comparison of its various subjects. It is difficult to combine our observations on groups that are scattered

in Dr. Latham's last edition of his "Synopsis" may be misconceived ; and that, from the well known fact of a considerable number of the described *Falcones* in that work being but varieties in age or sex of actual species, my statement of their amounting to two hundred and forty seven may be considered as an exaggeration, and as introduced only for the purpose of furthering my argument. Were the number of the *Falconidæ* however described in that work to be reduced even to one third, my argument would still hold good ; there would yet be a sufficient number to call for separation. But this is not the point in question. I stated that the student, who has a Linnean *Falco* to be identified, must compare it with the two hundred and forty seven descriptions relating to the genus contained in that work. It is of no consequence whether the descriptions are those of species or varieties, still they are descriptions which must be separately consulted. Even were these reputed species to be admitted as varieties, and arranged in their proper stations, the descriptions of them must still be separate, so strongly are they distinguished from each other, and the comparison of them must still afford equal labour to the student as if they were actual species. In stating therefore that the number of described species amounts to that specified above, I conceive that I err neither against the fact nor the legitimate modes of reasoning. The very circumstance itself, which is known to every tyro in Ornithology, who has gone no further in his studies than M. Temminck's Birds of Europe, that the species of the *Falconidæ* have been multiplied, *ad infinitum*, in consequence of their apparently specific differences, is a convincing proof of the necessity of their subdivision by decisive generic characters. Hitherto they have been separated by their differences only in size or colour, by the *striæ* or the *fasciæ* of a feather. These confessedly vary by age, by sex, by accident. But the generic characters adopted by modern writers are constant, (one or two instances perhaps excepted where age may more fully develope them ;) and as such they relieve the Naturalist from many difficulties in his investigation even of species. When he is once acquainted with the general nature of the changes that take place in this family, he is led to bring together those apparent species which differ only in the unimportant characters that are subject to variation, by a strict attention to those more essential points which are generic, and never vary.

and distant from each other, or to form any decided opinion on their mutual affinities or analogies, where we can only deduce our inferences from recollection.

Such are the difficulties which, among others, render it almost hopeless for the naturalist to attempt that finished detail, which it would be his object to exhibit, of the subject which he investigates. But still it is preferable, as I before observed, to make some advance than to stand still, and to accomplish something, though all cannot be effected. The following observations will strictly accord with these views. They are intended to embrace the different opinions which have been entertained by naturalists of all countries on the several groups of Ornithology that will occasionally come before me. They will bring together for the first time in this country the modern genera that have been established by foreigners; for strange to say, we have no work * of English growth on Ornithology, which professes to give more than the genera of Linnæus, with some few unimportant additions. They will endeavour to bring these detached groups into such order as will at least afford some idea of their natural station. And the whole will be conducted with a particular reference to their affinities and analogies, and with a view to those principles † of mutual connection among themselves, according to which the investigation of the subjects of Natural History is now generally carried on. However imperfect the results may be of the present undertaking, the particular mode of inquiry pursued, will I think afford a clue to future investigation, according as opportunity and more extended information tend to render the prospect of success in it more probable.

* I must except the Continuation of Dr. Shaw's Zoology, conducted by my friend Mr. Stephens, whose introduction of the modern views on Ornithology into the last volumes of that work that have come more especially under his care, and whose ability in unfolding them, is deserving of every commendation. I must also observe that the same views, and more particularly those of M. Cuvier, are to be found briefly referred to in Dr. Fleming's valuable work on the "Philosophy of Zoology."

† It is scarcely necessary to subjoin, that I allude to the principles developed by Mr. Mac Leay in his "*Horræ Entomologicæ*;" which I am happy to find are every day becoming more known, and more valued as they are more known.

ON THE GROUPS OF THE FALCONIDÆ.

In entering on the investigation of any extensive group in Natural History, the surest guide to the accurate distribution of the individuals that compose it, is to fix our attention on those in which the typical character that distinguishes the group is most fully developed. This point being determined, we descend with ease to those more remote species, which partially deviate from the type, and partake of the characters of the next adjoining groups that are connected with their own.

On looking for the typical character among the numerous species that compose the Family of *Falconidæ*, or the genus *Falco* of Linnæus, we may at first thought feel inclined to assign the place of superiority to those which display the size and strength of the *Eagles*:—*Aquilæ maximus honos, maxima et vis*.^{*}—It is not however in such qualities that the perfection of the present group consists. The Family of the *Vultures* which is immediately connected with it, possesses these qualities even to a greater extent, and there they may form a ground for typical preeminence. But the present group is distinguished from the other Birds of Prey more by their courage than their size, more by their dexterity in pursuing and seizing their prey, than their powers of body. And the species which carry this dexterity to the greatest extent, and whose powers of flight are most conducive to the rapid seizure of their prey upon the wing, are those which appear to be most endowed with the characteristick traits of the family. The same groups also possess a character that equally distinguishes them, in that superiour intelligence, if I may so call it, at least in that generosity and tractableness of disposition which brings them within the dominion of man. Taking these habits and dispositions exclusively into consideration, we may distinguish the groups of the *Falconidæ* into two separate divisions, which may be considered † *typical* and *aberrant*; and which the common

^{*} PLIN. Lib. x. c. 3.

† For the signification of the terms *typical* or *normal*, and *aberrant*, I have to refer the reader to the works of my distinguished friend Mr. Mac Leay, to whom I have before alluded. See particularly “*Horæ Entomologicæ*,” *passim*; and “*Linnean Transactions*,” Vol. XIV. Art. III.

language of those days in which the present tribes were most known and sought after for the purpose of Falconry, equally separated, with a view to the same habits and qualities, under the denomination of *noble* and *ignoble*.

The *noble* or typical groups of the *Falconidæ*, thus characterized by their manners, are equally set apart from the rest of the family by external character. Their bill is strong, short, curved from the base, and more or less dentated. This character of the toothed bill may be considered as strongly indicative of raptorial habits. A similar peculiarity it may be observed, discernible among some of the Order of *Insessores** is resorted to as a mark of distinction between the birds which prey upon insects, and those whose food is vegetable. And it is this character which, next to habit, preserves the analogy between the *Raptores* of the Class of Birds, and the *Carnivora*, or *Feræ* of Linnæus, among the *Mammalia*. It thus may be looked upon as an ostensible and important mark of separation among the tribes of birds in general, and as a character, of which the greater developement may more particularly be considered the strongest evidence of typical superiority in the raptorial group before us.

The typical groups, thus distinguished, arrange themselves into two divisions or *stirpes*; the first of which is known by the shortness of the wings, which do not extend further than two thirds of the tail; the second, by the wings extending to an equal, or nearly an equal length with the tail. The former of these normal *stirpes*, which is distinguished from all the other short-winged *Falconidæ* by the bill being curved from the base, I shall denominate, for the sake of perspicuity, *Stirps Accipitrina* or *HAWKS*; the latter, which is equally distinguished from all the long-winged groups of the family by the strong dentation of the bill, I shall call *Stirps Falconina*, or *FALCONS*. The external character of these typical groups can never be mistaken. They will either present, like the true *Falcons*, a bill strongly dentated, which at once de-

* It may be here necessary to state that in referring to the "*Insessores*," or *Perching Birds*, I use a term introduced in some Observations of mine "On the Natural Affinities of Birds," lately read before the Linnean Society. The Order embraces the united Linnean Orders of *Picæ* and *Passeres*.

cides their station : or if, as in some of the *Hawks*, the mandible is entire, or marked only by a rounded protuberance instead of a tooth, they will exhibit the united characters of short wings, and short bills, which though observable separately in other groups of the family, are found united in no species besides those of the *Hawks*.

Of the aberrant or *ignoble* species of the family, a group presents itself nearly approaching that of the *Falcons* in the length of the wings, and the general form of the bill, but separated from it by the absence of a tooth on the upper mandible. The deficiency in this character indicates at once a falling off from the superiour courage and higher faculties of the typical division of the family. Its habits are conformably to this deficiency slothful and cowardly ; it does not pursue its prey upon the wing, but seizes it by stealth and in ambuscade ; while it is also found, unlike the nobler *Falconidæ*, to feed upon substances not procured by its own rapine. This group may be distinguished according to the denomination of its type, as *Stirps Buteonina*, or BUZZARDS.

Nearly allied to the last division in their inferiour habits and faculties, is a group of which the well-known *F. Milvus* of Linnaeus forms the most conspicuous type. Possessing however an even still weaker bill and feebler talons than the *Buzzards*, it is particularly distinguished from them by its tail being more or less forked, and its wings longer than the tail. These last-mentioned particulars give the present group a decidedly distinct character in their mode of flight. They seem to glide through the air with an easy and imperceptible motion, sailing* in circles with a grace and elegance peculiarly their own. This fourth group may be set apart as the *Stirps Milvina*, or KITES.

The entire of the remaining species of *Falconidæ*, that are not

* *Iidem* (milvi) videntur artem gubernandi docuisse caudæ flexibus, in cælo monstrante naturâ, quod opus esset in profundo. *PLIN.* lib. x. c. x. Alis expansis in aëre se librat: quin nullâ vel rarâ alarum agitatione de loco in locum provehitur velut fluxu aut lapsu quodum. Hinc Anglis *Glead* dicitur a verbo *glide*, quod labi motu velut insensibili et tranquillo absque agitatione aliquâ aut subsultu significat, ut flumen super planitiem sensim declivem. *RAY.* Syn. Meth. Av. p. 17.

included in any of the preceding *stirpes*, are united among themselves, as well as separated from all the others, by the bill being lengthened, nearly straight at the base, and hooked only at the apex. Among them are to be found the most powerful birds of the family, and the most destructive in their habits; their size and strength enabling them to extend their ravages even over the larger animals. They are deficient however in those powers of pursuing their prey upon the wing which belong to the more typical groups; their flight, although powerful, not possessing that quickness in turning, and that agility in pursuit, which is exhibited in the *Hawks* and *Falcons*. They are thus confined in their ravages, in common with the other aberrant *stirpes*, to the prey which they can seize on the ground.* In the lengthened form of the bill they are allied to the family of *Vulturidæ*, which immediately precedes them in the general arrangement of the *Raptorial* order; while they differ from them in external character by their heads being entirely covered with feathers. The present *stirps* consists of a considerable number of species, and is separated also into several generick groups, differing partially in habits and external character; some being confined to the land in quest of their prey, while others visit the waters for that purpose; some again being characterized by a length of wing, while others, connecting the group with the short-winged *Hawks*, are noted for the shortness of that member. The whole however are sufficiently united among themselves by general habits and character, and may be denomi-

* This striking difference in the habits of the *Falconidæ* was not passed over by the ancients, who were much more diligent observers of Nature than we are in general inclined to admit them to have been. Aristotle expressly refers to it: *γενη δε των ιερικων*—*διαφερουσι δ' αλληλων*· *οι μεν γαρ αυτων επι της γης καθημενην τυπτουσι την περιστερην και συναρπαγουσι, πετομενης δ' ου διγγαυουσιν*· *οι δ' επι δενδρου μεν η τινος αλλου καθημενης θηρεουσιν, επι της γης θ' ουσης η μετεωρου ουκ απτονται*· *οι δε ουτ' επι της γης ουτ' επ' αλλου καθημενης διγγανουσιν, αλλα πετομενην πειρωνται λαμβανειν*. De Animal. Lib. ix. c. 24. Pliny equally distinguishes the family by these differences in habit. *Distinctio generum ex aviditate: alii non nisi ex terrâ rapiunt avem: alii non nisi circa arbores volitantem: alii sedentem in sublimi: alij, volitantem in aperto*. Lib. x. cap. 8.

nated, according to the usual term applied to the most typical of the group, *Stirps Aquilina* or EAGLES.

These five groups into which the *Falconidæ* thus branch out, may be exhibited at one view in the following order. I arrange them according to their typical and aberrant characters, noticing those habits and peculiarities of form only, which are most conspicuous, and most important in the general distribution of the family.

TYPICAL GROUPS.

| | | |
|--|---------------|------------------------------|
| Rostra breviora, præcipue dentata. Præda æria. | { Alæ breves. | { <i>Stirps Accipitrina.</i> |
| | | { HAWKS. |
| | { Alæ longæ. | { <i>Stirps Falconina.</i> |
| | | { FALCONS. |

ABERRANT GROUPS.

| | | |
|---|----------------------------------|----------------------------|
| Rostra longa, aut sublonga, haud dentata. Præda terrestris. | { Rostra a basi adunca. | { <i>Stirps Buteonina.</i> |
| | Alæ longæ. | { BUZZARDS. |
| | { Rostra a basi adunca. | { <i>Stirps Milvina.</i> |
| | Cauda furcata. Alæ longissimæ. | { KITES. |
| | { Rostra ad apicem solum adunca. | { <i>Stirps Aquilina.</i> |
| | * Alæ longæ. | { EAGLES. |
| | ** Alæ breves. | |

When we descend into the details of any group, which is subdivided, like that before us, into *stirpes* returning into themselves, it is of little consequence at which subdivision we commence our examination. Forming a circular series, they exhibit no natural break upon which we can fix as a regular land-mark to start from. It is adviseable, nevertheless, to have some uniform plan of proceeding; and the most obvious, and perhaps preferable mode appears to be that of our commencing our inquiries with the first of the typical *stirpes*; and it is indeed, I believe, the usual course adopted. As this is however a mere matter of option, and depends much on the particular views in which individuals are accustomed to conduct their researches, I am more willing to adopt the mode of giving my attention in the first setting out to that extreme subdivision of any group which is immediately connected with the

group that precedes it. I thus enter upon every group at the point where it joins that from which I have parted : I thence gradually ascend to the most typical division of it, which thus becomes placed in the centre ; and thence I finally descend in order to the other extreme. In pursuing this uniform mode of proceeding, when I find a group complete in its general outlines, or consisting of five subdivisions returning into themselves, the subdivision which I call the 1st, naming it such only with reference to the order in which I examine it, is always that which is united with the group that went before : the 3rd contains the type *par excellence* : and the 4th is that which forms the link of connexion between the present group and that which succeeds. The 2nd and 3rd will thus be the normal subdivisions ; the 4th, 5th and 1st the aberrant. In the more extensive groups of natural history which I have examined with respect to their affinities, and in which natural character is sufficiently strong to afford sure grounds for distribution, this disposition invariably appears to me to prevail. This therefore is the order in which I shall observe upon the birds at present before us, and to which, for the sake of uniformity, I shall adhere in my future examinations.

§. 1. *Stirps Aquilina.* EAGLES.

The long bills of the *Vultures*, straight at the base, and hooked only at the apex, are carried on to the *Falconidae*, from which they are separated by the sufficiently distinctive external character of having the head, neck, and cheeks more or less naked. As however the extremes of every group participate in some measure in the characters of those that approach it, we must not be surprised at finding species appertaining to each of these two families, which it is difficult to arrange decidedly on either side. The naked cheeks of the *Vultures* are thus observable in a few Birds of Prey, which have been almost universally allowed to belong to the *Eagles*, and have particularly been ranked as such by their earlier describers, who having had the opportunity of observing their living manners may be supposed to have been the best judges of their natural affinities. In these extreme cases every naturalist takes that side of

the question which is most consonant to his peculiar views, and which best accords with the predominance of those characters on which he chiefly depends for distinction between his groups. Founding thus the line of demarcation between the *Vulturidæ* and the *Falconidæ* on the nakedness of the head and cheeks, M. Vieillot has united all the birds of which I speak with the former family: while M. Cuvier, on the other hand, has left them among the latter, forming his decision chiefly on their general appearance and habits. In the present state of the question I feel no hesitation in agreeing with M. Cuvier, and in retaining these birds in their original station, until at least more decided information than we can as yet obtain of them, enables us to speak with more confidence. We are furnished with an additional reason for this decision in the circumstance of these birds possessing this nakedness about the head in the adult state only; when young, their whole head is covered with feathers.* This fact, which has been ascertained to be the case at least in some species, evinces the gradual manner in which nature deserts any particular character or mode of formation. The birds before us thus pass without any abruptness into the *Eagles*, the full characters of which they possess in their earliest age. I shall adhere to the generick titles given to them by M. Vieillot, who appears to have been the first to have characterized them.

The group of the *Falconidæ* that seems nearest to the *Vultures* is the genus

IBYCTER, Vieill.

which is distinguished by the nakedness of its cheeks, throat, and crop. To this character M. Vieillot has added those of its bill being convex above; its inferiour mandible notched near the end, and somewhat pointed; its cere smooth; and its nails pointed. The type of the genus is the *F. aquilinus*, Gmel., the *Petit Aigle*.

* Il est certain que dans les jeunes *Caracaras noirs*, comme dans les jeunes du *Chimachima*, toute la tete est couverte de plumes, et que le tour des yeux est l'unique partie qui soit nue. La nudité de la tete augmente avec l'age.
TEMPL. Art. *Falco aterrimus*, Pl. Col. 37.

d'Amérique of M. Buffon.* I believe this species still stands single in the genus.

Closely allied to *Ibycter* appears

DAPTURIUS, Vieill.

founded upon a new species from Brazil, which the same author has denominated *D. ater*, and which he describes as differing from the last only in the lower mandible being obtuse, instead of pointed, and the cere being covered with hairs instead of being smooth. He particularizes also the orbits of the eyes only, and not the cheeks, as being naked, together with the throat and crop. It has been frequently objected to M. Vieillot's views of arrangement, that he founds his genera upon very minute and unimportant points of distinction. Although strongly inclined to the admission of all such genera as are founded upon ostensible characters, for reasons which I have stated at large elsewhere†, especially in such groups as from their extent require subdivision, I am nevertheless of opinion that great caution should be observed in introducing genera, which embrace but one species; such only being admissible as are decidedly separated by important characters. One great object aimed at in the subdivision of a numerous group is the relief which is afforded the student in his search after species, by the number of those belonging to each genus being lessened. But no such relief is gained where only a single species is cut off from the original group, the points of examination being still the same in number; the examination of a new generic character being substituted for that of the original specific one. How far the two preceding genera of M. Vieillot are sufficiently distinct from each other, or from the remainder of the naked-cheeked *Eagles* it is not for me to hazard an opinion, without the opportunity of more accurate examination of the birds than is at present within our power, and a more perfect knowledge of them, than a mere description affords us. It would appear however that one group, at least, that of *Ibycter*, is sufficiently distinguished from the other *Falconidae* with the naked cheeks, by the difference in its food and habits. The accounts

* Pl. Enl. 417. Gal. des Ois. pl. 6.

† Zool. Journal, No. II. p. 180.

which have reached Europe of its mild and gentle manners, and vegetable food, have even induced some naturalists to refer it to the Gallinaceous Birds. I have strong doubts indeed whether the birds that compose this genus may not belong to quite a distinct station from the present, and be referable to one of those groups which I have elsewhere observed to be wanting among the Birds of Prey, to perfect that chain of affinities which is to be found complete in all the other Orders. It is impossible, however, at present, to come to any decision on the subject; while our materials for classification are so scanty, the most that is in our power is to conjecture the place which more perfect information will enable us to assign any group hereafter. For the present, we may leave the genera before us in that situation between the *Vulturidæ* and *Falconidæ*, which they have hitherto been generally supposed to fill.

The remaining species of the *Eagles*, with naked cheeks, have been included under the title of

POLYBORUS, Vieill.

which agrees with the latter of the two preceding genera in the cere being covered with hairs, and the under mandible obtuse: but differs from both, according to M. Vieillot, in the same mandible being entire, the face alone naked, the *culmen* of the bill compressed instead of convex, and the nails nearly blunt. The type of the genus is the *F. Braziliensis* of Linnæus, the *Caracara* of M. Buffon. *F. Novæ Zelandiæ*, Lath. also belongs to this genus, to which M. Temminck has also referred *F. degener*, Ill.

We pass from the *Eagles* that form the foregoing groups, under the guidance of M. Cuvier, to the *Fishing Eagles* of the old Continent; the first of which that we may particularize is the genus

PANDION, Sav.

This group presents us with a decidedly characteristick difference from all the other species of the family, except those of *Elanus*, which I shall mention hereafter, in the internal part of the nails being rounded instead of grooved. The *culmen* of the bill is also more broad than usual, and much rounded. The toes are

entirely separated; and the *tarsi* are covered with strong, prominent, and thickly reticulated scales.* The well-known *Osprey* of our coasts, *F. haliæetus*, Linn., is the type of the genus to which the valuable researches of Dr. Horsfield, in Java, have added a second species, *P. Ichthyæetus*.† In this species, however, which agrees with *Pandion* in the more essential characters, we find a strong approximation to the following genus *Haliæetus*. Its bill is more compressed than that of *Pandion*, its *acrotarsia* are scutellated, and the fourth quill feather, as in *Haliæetus*, is the longest. It thus stands osculant between the two groups.

The last group of the *Fishing Eagles* is comprised in the genus

HALIÆETUS, Sav.

which differs from *Pandion* in the structure of the nails, and the more compressed *culmen* of the bill. The *tarsi* also differ in having the *acrotarsia* scutellated; they are also feathered half-way below the knee. The toes, like those of the last are entirely separated, and the outward versatile. Our common *Sea Eagle*, *F. leucocephalus*, Linn., affords the type of the genus, to which M. Cuvier has added *F. Pondicerianus*, Gmel. *F. blagrus*, *F. vocifer*, and *F. vulturinus* of M. Daudin. Some species lately described,

* The scales that cover the *acrotarsium* will be found to form a very distinguishing character among the *Falconidæ*. In some groups the *acrotarsia* are *scutellated*, or covered with transverse and nearly quadrate scales, each of which extends entirely across them. In others they are *reticulated* or covered with smaller scales, chiefly hexagonal, that run into each other in a kind of network, leaving two or more on a line in front. I take this opportunity of stating that in the present sketch I pass over many other characters of some importance, that may be referred to in illustrating these groups, such as the structure of the *acropodium*, *pelma*, *acroductylum*, *hypodactylum*, &c. with many others. The difficulty of procuring subjects for examination, and in sufficiently good condition to enable me to judge of these minuter characters, prevents me at present from referring to them at all, when I can not refer with precision. I hope the future observation of naturalists who have the opportunity of accurate examination, may be directed to these and similar characteristic marks of distinction. They will be found, I make no doubt, of singular service in illustrating the groups of Ornithology.

† HORSF. Linn. Transactions, xiii.

which I shall particularize hereafter, are also to be united to this group.

Upon leaving the *Fishing Eagles*, and entering upon those which feed upon land, we meet with

CIRCÆTUS, Vieill.

a genus founded upon the well-known *Jean le blanc* of the European Continent, *F. brachydactylus*, Linn. Here we find the exterior toe united to the middle by a short membrane, which is the case indeed in the greater portion of the family, while in the two latter genera the toes are all divided to the origin. The toes themselves also are considerably shorter than in general. The *acrotarsia* are reticulated, and the *nares* suboval and elongated.

Proceeding in the order of affinity, we approach the true

AQUILA, Auct.

in which the predominant mark of distinction is the *tarsi* being feathered to the toes. The *culmen* of the bill appears also to differ from that of the other *Eagles* in being more angular. The species *A. heliaca*,* Sav. *F. chrysætos*, Linn., *F. naevius*, Linn., *F. bellincosus*, Daud, with some others lately made known to us, belong to the group, which contains the most powerful birds in the family.

We now leave the *Eagles*, which are distinguished by their long wings, and enter upon the groups of the same *stirps*, which differ from them in the shortness of those members. Of these the most nearly allied to the true *Aquila* appears to be the

HARPYA, Cuv.

which equals that genus in size and powers of body. Its *tarsi* are

* M. Savigny appears to be the first who separated this species from the *Golden Eagle*, and at the same time characterized and named it as above. I really see no reason why his name should be removed to make way for that of *imperialis*, which M. Temminck has proposed for it. Neither can I see the propriety of giving up the old established title of *chrysætos*, for the well-known *Golden Eagle*, in order to adopt the modern denomination of *regalis*, which the same distinguished naturalist would affix to it. Where an objection lies to an established name, it may be expedient to alter it; but in the present cases, any change seems to me likely to produce confusion, without any assignable motive.

strong, thick, partly plumed, with scutellated *acrotarsia*. The *nares* are elongated, apparently simular, and placed transversely on the cere. The upper mandible seems to have a notch somewhat analogous to that of the true *Falcons*. Its type is the *F. imperialis* * of Dr. Shaw.

The genus

MORPHINUS, Cuv.

differs from the latter in its more slender, lengthened and scutellated *tarsi*, and the comparative weakness of its toes. It is separated into two sections as the *tarsi* are plumed or otherwise : among the former M. Cuvier arranges *F. occipitalis*, Daud. *F. ornatus*, Daud. *F. albescens*, Daud. *F. maculosa*, Vieill. ; among the latter *F. Guianensis*. Daud., and *F. uribitinga*, Linn. M. Vieillot's genus *Spizaetus* corresponds with this group.

M. Cuvier has separated another group from the rest of the short winged Eagles under the generick name of

CYMINDIS, Cuv.

which is distinguished by their short, half plumed, and reticulated *tarsi*, and more particularly by their nostrils being nearly closed, and bearing the appearance of a narrow slit, or channel. Its type is the *F. Cayennensis*, Gmel. to which M. Temminck has lately added *F. hamatus*, Ill., and *F. uncinatus*, Temm.

* Much confusion has arisen as to the synonyms of this bird, and even as to the characters of the genus. M. Cuvier says that the *tarsi* are reticulated, and M. Vieillot that the *nares* are round. Neither of these characters agree with those of the " aigle destructeur de Daudin" to which bird both of these gentlemen refer as their type. The short description above is drawn from the figures of *F. destructor* given by M. Temminck in his " Planches Coloriées," [pl. 14.] and by Mr. Swainson in his " Zoology of Mexico." All these difficulties however will be shortly cleared away by the description of the bird from a living specimen, which has been for some time in fine condition in the gardens of the Horticultural Society. I have been favoured with a sight of this bird by the kindness of my friend Mr. Sabine ; but I am restricted from making any reference to it, that might amend the above imperfect description, in consequence of that gentleman having informed me that he is about to describe the bird himself. I rejoice that it has got into such good hands, and from the excellent opportunity that occurs of observing its manners and essential characters, I anticipate much interesting and scientific intelligence on one of the most important points in the economy of the *Falconidæ*.

It is among these *short winged Eagles* that the greatest difficulty prevails in deciding on their immediate affinities. Being for the most part extra-European, and not within the reach of general examination, their manners also being but little noted, and the characters on which we depend for forming our decision respecting their affinities being for the most part passed over in the descriptions given of them, it is only by conjecture that we can assign them a place in the general arrangement. Of this nature is the genus

ASTURINA, Vieill.

which seems by its short wings, and bill straight at the base, to belong to the groups now before us; and to owe its generic name and distinction chiefly to the form of its *nares*, which according to M. Vieillot, are lunulated. Its *tarsi* also are short and somewhat slender. It contains *A. cinerea*, Vieill. a species from Guiana.

The same difficulty extends to several other described species of the *Falconidae*, which appear to me to belong to the group before us of *short winged Eagles*, although they have been assigned a different locality by the authours who have described them. Among these is the *F. Bacha*, Daud. [Le Vaill. Ois. d'Afr. pl. 15.] which has been generally ranked with the *Buzzards*. Its short wings and lengthened bill however seem rather to bring it among the present group of the *Eagles*, and its habits as described to me by my friend Dr. Horsfield, who had an opportunity of closely observing them in the Island of Java, where the birds are by no means uncommon, do not in any respect correspond with those of the *Buzzard* tribe. I would place it, together with *F. albidus*, Cuv. [Pl. Col. 19.] near those species of the genus *Cymindis* which are distinguished by the reticulated *acrotarsia*, if not in that genus itself. I have indeed some doubts whether most of the short winged *Falconidae* at present placed among the *Buzzards*, such as *F. buson*, Daud., *F. tuchiro*, Daud., *F. pæcilonotus*, Cuv. &c. may not be more properly removed to a situation between the *short winged Eagles* and the *Hawks*, with both of which they seem to have a considerable affinity.

There is another group which also appears allied to the present,

distinguished by a rather feeble and elongated bill, short wings, and slender, lengthened *tarsi*, feathered to the toes. It includes the *F. Limnæetus*, Horsf. [Zool. Res. No. 6. Pl. Col. 134.] *F. niveus*, Temm. [Pl. Col. 127.] and *F. atricapillus*, Cuv. [Pl. Col. 79.] These appear to be strongly allied, if not to appertain, to the before mentioned genus *Morphnus*. *F. tyrannus*, Pr. Max. [Pl. Col. 73.] bears a strong similitude also to the same group, though partially differing in external characters. But on these and similar affinities I do not wish at present to dwell, until a more general examination of the birds themselves, brought together and accurately compared with each other, and a more intimate acquaintance with their habits, affords more solid grounds than mere conjecture for forming a decision.

§. 2. *Stirps Accipitrina*. HAWKS.

The short wings of the last groups lead us to the present division of *Hawks*, all of whom, a considerably extensive tribe, are characterized by their wings extending no further than two thirds of the extent of their tail. The fourth quill feather is the longest, the first, second, and third, gradually exceeding each other in length. In this division we may observe that the upper mandible, though not furnished with distinct teeth like the true *Falcons*, has the festoon or prominence, that generally supplies its place, more strong and angular than is usual among these tribes. In some of the *Accipitres* this is particularly distinguishable.*

The *stirps* we have just quitted, includes all the birds of the present family, in which the beak is straight at the base, and hooked only at the apex. We now enter upon the first of those groups where the bill is curved from the base, a character that extends through the remainder of the *Falconidæ*. It may be observed that this character which thus separates the family into two departments, was equally noticed as a mark of distinction

* M. Temminck perhaps goes too far in calling this festoon "une dent tres marquée." It is sufficiently strongly marked however to show an affinity to the typical group of the family.

between the species known to the ancients. Pliny apparently referring to it as a line of demarcation between them, divides the group into his two departments of *Aquilæ* and *Accipitres*. It is from adopting the same views respecting the family, that M. Brisson instituted his two leading divisions, to which he assigned corresponding denominations.

The *Hawks* being a numerous group, it seems adviseable to adopt such divisions in arranging them, as will lessen the number of species in each. They have generally been included in one genus, to which a variety of names has been given.* But a sufficiently characteristick difference may be discerned in the comparative elevation of their *tarsi*, and in the structure of the *acrotarsia*. Three divisions, which have been pointed out by M. Cuvier, may in this manner be instituted. The first of these,

DÆDALION, Sav.

may be distinguished from the others by its *tarsi*, strong and of moderate length, being covered with reticulated scales. Of this genus the American species *F. cachinnans*, Linn. and *F. melanops*, Lath. form the type, according to M. Cuvier. M. Savigny has conferred the title of *Dædalion* upon the whole of this *stirps*, and his name, which cannot be retained for the whole, may be adopted for the present division of it.

The second division of the present *stirps* is the genus

ASTUR, Bechst.

a title which has been applied to the whole group, but which may be confined to those whose *tarsi*, moderate in length, have their *acrotarsia* scutellated, or covered with broad and even scales. Our European species, *F. palumbarius*, Linn. may be considered the type of this genus; to which may be added *F. Novæ Hollandiæ*, Lath., and a considerable number of corresponding species from every quarter of the globe.

The third genus of the *Hawks* includes those whose *tarsi* are considerably elevated, slender, and like the last scutellated. The scales are thin and smooth, and generally so imperceptibly united

* It has been called *Astur*, *Dædalion*, *Sparvius*, &c.

to each other as to give the appearance of but one continued covering to the *acrotarsium*. To these I would restore the old title by which they were so long distinguished of

ACCIPITER, Auct.

and which having been adopted by Ray and Brisson, appears to have a prior right in designating the group to the names bestowed on it by modern naturalists. It corresponds with the genus *Nisus* of M. Cuvier. Our common *Sparrow hawk*, *Accipiter fringillarius** of Ray, is the type of the genus, to which may be added many corresponding species, which do not seem to have any limits to their geographical distribution.

There are some species which seem to be allied to this *stirps* and to be intermediate between it, and the succeeding *stirps* of *Falcons*, which, from some peculiarities of character, cannot well be appended to any established genus. They possess a shortness of wing which would incline us to refer them to some of the present groups: but their upper mandible strongly and doubly dentated, presents a character that will not admit of their being included in any of the foregoing genera in which the mandibles are entire, or where the place of the tooth is supplied by a rounded prominence. These species I should have wished if possible to have arranged in one genus: but they are found to differ in essential points, which bring them respectively within the pale of the two conterminous *stirpes* now under consideration. And although I do not in general wish to encrease the number of genera belonging to the present family, until we have attained a more extensive and accurate knowledge of the species, I feel obliged for the sake of perspicuity to adopt the following genus, of which the type is the *F. bidentatus*, Lath.

HARPAGUS.

The essential characteristick of this group is the double tooth on both the upper and lower mandible. The wings, which correspond with those of the other *Hawks*, in being one third shorter

* I know not why this term should have been altered into that of *Nisus*: the bird into which the fether of Scylla was changed was certainly a fishing Eagle. See PENNANT, Brit. Zool. Vol. I. p. 208. Ed. 8vo. OVID. Met. Lib. 8.

than the tail, have the third and fourth quill feathers, which are the longest, of equal length. The *tarsi* are of moderate length and strength, and have the *acrotarsia* scutellated as in the latter groups of the present *stirps*. The *nares* are of a semicircular form, and the cere is naked. The *F. Diodon* of M. Temminck is to be referred to this genus.

§. 3. *Stirps Falconina*. FALCONS.

Closely allied to the preceding genus by the double tooth on its upper mandible, and its short wings, is another group for which I shall propose the name of

IERAX,*

a common term applied to many of the *Falconidæ*, and which has recently been conferred on the genus *Accipiter*, but certainly without attention to the original designation of that group. Whoever has seen that beautiful species, the smallest of its race, *F. cærulescens*, Linn., now rendered familiar to us by the accurate and splendid illustrations of Dr. Horsfield, will at once acknowledge its separation from every other established genus of the family. Its upper mandible is strongly and sharply bidentated, as in *Harpagus*, but the under mandible is simply notched, as in the true *Falcons*. Its wings, shorter than the tail, differ also from those of *Harpagus*, in having the second quill feather the longest, thus again establishing the affinity of the genus to the *Falcons*. The *tarsi* are moderate, and the *acrotarsia* scutellated as in the latter groups of the *Hawks*. From its thus possessing

* My friend Dr. Leach has adopted this term for the group to which I would restore the name of *Accipiter*, and has named the *A. fringillarius* in the Collection of British Birds belonging to the British Museum accordingly. I should certainly subscribe to his views in this instance, were I not satisfied that the term *Accipiter* had been already attached to that group, and that *ἱεραξ* had been applied by Aristotle not only to our *Sparrow Hawk*, but to the greater part of the short billed *Falconidæ*. Aristotle in fact appears to have divided the family into the three grand divisions of *αἰετοί*, *ἱερακες*, and *ικτινοί*, of which he also specifies the subdivisions. The *ἱερακες* comprise all our *Falconidæ* which belong to the *stirpes* of *Hawks*, *Falcons*, and *Buzzards*.

characters in common with both *stirpes*, it is difficult to say to which we should refer it. But I prefer placing it in its present situation on account of the length of the second quill feather, a peculiarity which distinguishes the true *Falcons*, and gives a striking character to their flight. Placed however at the extremity of the division, it preserves its affinity with those that went before.

The greater portion of the present *stirps* is included under the genus

FALCO, Auct.

which comprises the typical species of the family. The upper mandible of this group is armed with a strong angular tooth; the lower is notched near the extremity. The *nares* are rounded. The wings are for the most part as long as the tail, the second quill feathers being invariably the longest. The first and second quill feathers are also distinguished by an abrupt emargination on the inner web, near the extremity. In some species, as in *F. peregrinus*, the emargination of the second quill feather is not so abrupt as in others. But in all the species of the true *Falcons* that have come under my examination, this emargination of the first quill feather at least is strongly apparent. The *tarsi* are moderate in length and strength, and have the *acrotarsia* reticulated. Our European species, *F. peregrinus*, Linn. *F. subbuteo*, Linn. *F. æsalon*, Linn. *F. rufipes*, Bechst. are readily distinguished as belonging to this typical genus. Some species belonging to the group have the wings somewhat shorter than the tail, which in conjunction with *Ierax* thus evince a gradual series of affinity between the short and long winged tribes. Among these we may distinguish *F. tinnunculus*, Linn. *F. rupicolus*, Daud. * with some corresponding species.

M. Cuvier has separated the *F. Islandicus*, Lath., from the rest of the true *Falcons*, under the generic title of *Hierofalco*, which

* There seem to be no limits affixed to the geographical distribution of the true *Falcons*. This indeed appears generally the case in the larger groups of this family. The naked checked *Falconidæ* alone seem to be confined to the southern parts of the New World, and to *Australasia*, if we are to refer *F. Novæ Zelandiæ* of Dr. Latham to the genus *Polyborus* according to M. Temminck's opinion. But the remaining groups appear to be dispersed in every division of the globe.

he characterizes as possessing no tooth on the upper mandible, but a rounded prominence in the centre, and in which he observes that the wings considerably fall short of the tail in length. With all due respect to the authority of that distinguished naturalist, whose exertions have so much enhanced the value of science, I cannot acquiesce in his opinion respecting the characters of this bird. I have examples at this moment before me of the *Jerfalcon* in its different stages of growth, and in none do I perceive any material difference between its bill and that of the true *Falcons*. Although anxious for the establishment of every such division, as may simplify the arrangement of extensive groups, I feel adverse to the admission of one, which seems to possess no distinguishing character, but what is purely specifick.*

§. 4. *Stirps Buteonina*. BZZARDS.

The fourth division of the *Falconidæ*, or that of the *Buzzards*, agrees with the latter in the length of the wings, and the bill being bent from the base. It is distinguished from it by a weaker and somewhat more elongated bill, by the third or fourth quill feather being the longest, and more particularly by the absence of a tooth on the upper mandible. A gradation of affinities seems however,

* I feel much hesitation in advancing the above opinion, not merely on account of the known accuracy of the distinguished naturalist who has separated the group, but on account of some facts that have lately come to my knowledge. In the British Museum is a specimen of the *F. Islandicus*, in which the upper mandible accords exactly with M. Cuvier's description;—"il n'a qu'un feston comme celui des ignobles." In several lately arrived specimens however from the Arctick regions in the same collection, the tooth is found. We may observe that in the "Planches Enluminées," one of the figures to which M. Cuvier refers [pl. 210] is, as he describes, without a tooth: the *acrotarsia* also are scutellated, which is not the case in our *Jerfalcon*. The second figure to which he refers [pl. 440] has the rudiments only of the tooth with the legs feathered to the toes; the third [pl. 462] has the tooth distinctly marked. Is it possible that there are two species? This is a point which requires elucidation. I cannot think that the character itself is variable, or that M. Cuvier would have adopted one which must have been known to him as such, even from the plates. In no specimen of a true Falcon have I seen the slightest alteration in the structure of the tooth except by accident.

as usual, to soften down these differences, and we perceive in the mandibles of the genus

ICTINIA, Vieill.

an approximation to the teeth of the *Falcons*. This genus is founded upon the *Milan Cresserelle* of M. Vieillot, and exhibits a strong and short bill, the upper mandible of which is somewhat angularly festooned, and the under distinctly notched. The *nares* are rounded as in the *Falcons*; the *tarsi* are rather short, and feathered below the knees, and the *acrotarsia* scutellated. The wings are of considerable length, extending far beyond the tail, a character which has induced M. Vieillot and others to place this bird near the *Kites*. Its strong affinity, however, to the last *Stirps*, of which it possesses so many of the characteristics, inclines me to assign it its present situation. In manners it seems also to approach the *Falcons*. If we consider the *Mississippi Kite* of Mr. Wilson* to belong to the present group of M. Vieillot, of which I have little doubt, we must attribute to the bird before us, judging from the interesting description in the American Ornithology, much of those spirited and generous qualities which we admire in the typical groups of the family.†

The genus

CIRCUS, Auct.

exhibits still a slight approximation to the last groups in the struc-

* Amer. Orn. pl. 25. f. 3.

† M. Temminck, in speaking of the *Harpagus bidentatus* [pl. col. 38.] observes, that the apparent anomaly of the double tooth is not confined to that species, but is found in some undescribed *Buzzards*, and more particularly in a new species allied to *Pernis*. These birds will most probably come into the present situation, and encrease the number of those groups which, with *Ictinia*, form the intervening bond of union between the true *Falcons* and the *Buzzards*. He also mentions some birds that he is about to describe, with the bill and wings of the *Hawks*, but with some other strong characters of the *Falcons*. These again will add to the number of those intervening groups that have been already seen to connect those two *stirpes*. M. Temminck subjoins to these remarks, "les feseurs de genres nouveaux, trouvent ici des entraves contraires a leurs vues strictement methodiques." I cannot think so. Every discovery of these singular affinities rather evinces the necessity of the subdivisions that are every day taking place. Indeed the valuable observations of that distinguished naturalist himself afford us the strongest proof of the justness of the modern views, against which he so expressly sets his face.

ture of the upper mandible, which has a rounded protuberance towards the middle similar to that of the *Hawks*. They are distinguished from the rest of the *Buzzards* by their elevated and slender *tarsi*, which are covered with feathers for some space below the knee, and of which the *acrotarsia* are scutellated. The *nares* are suboval, and transverse on the cere. And the third quill feathers are the longest. It includes the European species, *F. æruginosus*, Aldrov. and *F. pygargus*, Linn. to which may be added *F. acoli*, Daud. *F. melanoleucos*, Daud. together with some newly described species.

The present *stirps* of *Buzzards* is that which of all the *Falconidæ* approaches nearest to the family of the *Strigidæ*. In their dull and slothful habits, their heavy flight, and indeed their whole appearance, these contiguous groups evince a general resemblance that indicates a corresponding inferiority in those qualities which belong to the Birds of Prey. The soft and loose texture of the plumage of both presents a similar affinity. The genus immediately before us furnishes us with a still further, and more intimate, point of resemblance. The feathers that cover the cheeks and ears form a sort of rounded collar that rises on each side of the face; thus exhibiting a conformity to the disk or circular erection of the face feathers so conspicuous in the *Owls*.

From the *Buzzards* properly so called a group has been separated under the denomination of

PERNIS, Cuv.

which is distinguished by the singular character of the *lorum*, that surrounds the eye, being covered with feathers, instead of being naked as in the other *Falconidæ*, or furnished only with hairs. In other respects also, the genus differs from that of *Buteo* which follows. Its *acrotarsia* are reticulated, and like *Circus*, it has the third quill feather the longest. The *nares* are similar to those of *Buteo*. Our *Honey Buzzard*, *F. apivorus*, Linn., and a corresponding species from Java, *F. ptilorynchus*, Temm., form the typical species of this genus.

The true *Buzzards* known by their comparatively feeble bill, their short *tarsi*, and scutellated *acrotarsia*, are comprised in the genus

BUTEO, Auct.

Their *nares* are round, and their fourth quill feather the longest. Their *tarsi* are either plumed to the toes or half way covered with feathers. Of those whose *tarsi* are completely feathered, the *booted Falcon* of our cabinets, *F. lagopus*, Linn. presents the type; to which *F. desertorum*, Daud. appears also to appertain: of those birds whose *tarsi* are but half plumed, our common *Buzzard*, *B. vulgaris*, Auct., *F. buteo*, Linn. affords a familiar example. The genus is very numerous in species, and the form is very generally to be observed over the globe.

§. 5. *Stirps Milvina*. KITES.

We have now arrived at the last division of the family, which is nearly allied to that immediately preceding in habits and general conformation; but which exhibits a sufficiently characteristick difference in the length of the wings, and the forked structure of the tail. These characters, as I have before observed, separate the *Kites* from all the other *Raptorial Birds* by the peculiar power and gracefulness which they confer upon their flight. They are divided into two genera, as follows.

The first, the genus

ELANUS, Sav.

is known by its long wings, of which the second quill feather is the longest, its half-plumed and reticulated *tarsi*, its toes entirely separated, its cere covered, and its nails large and pointed. The latter also, with the exception of the middle nail, are rounded underneath, as in the genus *Pandion*. *F. melanopterus*, Daud. forms the type, to which we may add *F. furcatus*, Linn., and *F. Riocourii*, Vieill. In these last species, however, the tail is considerably more forked than in the former, and the *ungues* do not exhibit the singular roundness underneath, discoverable in *E. melanopterus*.* The genus may thus be separated for the present into two sections.

* I infer this circumstance from the silence of M.M. Wilson and Temminck on the subject, who would certainly have pointed out so striking a character, if it existed in the bird. A specimen of *E. Riocourii*, in the British Museum, does not appear to possess the character, but the *ungues* are so mutilated that nothing decisive can be determined respecting them.

The true

MILVUS, Auct.

is distinguished from the last genus by the fourth quill feather being the longest, by the *acrotarsia* being scutellated, and the exterior toe united to the middle by a membrane. It contains the European species, *M. ictinus*, Sav. (*F. Milvus*, Linn.) and *F. ater*, Linn. Although the species of this genus are noted for a feeble bill, it may be observed that it is not so much bent at the base, as in the typical species of the family, but exhibits somewhat of the length and straightness that characterize the bill of the *Eagles*. Some of the extremes of these last birds are found to approach the present *stirps* also in form and organization. The whole of those which in South America are known under the name of *Caracara*, from their singular cry, and which are included in the earliest genera of this arrangement, present a bill much weaker than that of the typical *Eagles*, and nearly meeting the bill of the *Kites*. We find indeed that the type of the genus *Polyborus* was described by Ray as *Milvus Braziliensis*,* and with similar denominations by others of the earlier writers : nor has the affinity been less noticed by our later naturalists. †I do not, however, feel sufficiently satisfied with respect to the immediate affinities by which these two *stirpes* are connected. We know too little of the birds that form the extreme groups of the *Eagles* to speak of them with

* *Milvus Braziliensis*, *Caracara* dictus. RAY. Syn. Method. Av. p. 17. M. Brisson calls this bird *Circus Braziliensis*.

† M. Temminck has pointed out this affinity of the *Caracaras* to the *Kites*, as well as that which they exhibit to the *Vultures*; at the same time stating the difficulty which these double affinities impose upon him. "Il se presente quelques difficultés dans cet arrangement: elles naissant des formes exterieures de ces *Caracaras*, qui les associent aux *Milans* et aux *Buses*, ainsi que du choix decidé que certaines especes montrent sur les charognes; ce qui les rapprocherait des *Fautours* et des *Cathartes*, s'ils n'étaient en meme temps entomophages, et reptilivores." TEMM. Art. *Falco aterrimus*, Pl. Col. 37. We have already seen how these groups preserve their affinities at once to the *Vultures*, the *Eagles*, and the *Kites*. It is one of the greatest beauties of that circular disposition which is so generally observed to prevail throughout nature, that it removes those difficulties that stand in the way of the naturalist, and explains those apparent anomalies, that would otherwise tend to interrupt his progress.

any pretensions to precision; and at present I shall content myself with referring only to the general approximation that appears to exist between them. At a future day I hope to be able to say something more decisive.

For the clearer explanation of the mode in which the foregoing groups appear to be distributed, I shall draw out the following tabular arrangement, which exhibits at one view their leading characters. In this table I particularize those peculiarities only which chiefly serve to distinguish them from each other, without entering into their minuter characters. These indeed are difficult to be laid hold of, while we have so few subjects for examination, and are obliged to rely so much upon the figures and descriptions of others. The characters, it is also to be observed, are those of the most typical of each group.

Fam. FALCONIDÆ.* Leach.

Caput plumosum. *Rostrum* forte, aduncum, basi cerigerum. *Nares* laterales, in ceromate positæ, plus aut minus rotundatæ, apertæ. *Digiti* externi præcipue mediis connexi. *Ungues* validi, acutissimi, maxime incurvi, retractiles.†

* The British species are distinguished in the following table by *Italicks*.

† The retractile power of the nails consists in the capability of elevating them at pleasure, (not of withdrawing them entirely within the skin as in some of the analogous *Carnivora*) by which means they avoid all contact with the ground or other substances which might destroy the sharpness so necessary to them in seizing their prey; “c’est a dire,” says M. Savigny, “pouvant se replier spontanément sur les penultimes phalanges.” The analogical character thus existing between different departments of the animal world has afforded one of those beautiful illustrations, with which an accurate observation of nature furnishes, at times, the philosopher, in his delineations of other branches of science. The following adaptation of these external qualities of animals to the powers of the mind is singularly appropriate, and conclusive. Ωςπερ γαρ οἱ αἰτοὶ καὶ οἱ λέοντες ἐν τῷ περιπατεῖν συστρεφουσιν εἰς τὴν οὐχῆαν, ἵνα μὴ τὴν ἀκμὴν αὐτῶν καὶ τὴν οὐχὺτητα κατατριβῶσιν, ἔτω τὸ ποιοπραγμονεῖν φιλομαθὲς ἀκμὴν τινα καὶ σομῶμα νομιζόντες εἶχειν, μὴ καταναλισκώμεν, μηδ’ ἀπαμβλυνώμεν ἐν τοῖς χεῖριστοῖς. PLUTARCH. de Curiosate. Opera, Vol. 8. p. 67. Ed. Reiske.

§. 1. *Stirps Aquilina.*

Rostrum
longum
ad api-
cem so-
lum ad-
uncum.
Remex
4tus præ-
cipue
longissi-
mus.

*Alæ
longæ.

Rostrum superne convexum. *Mandibula* inferior ad apicem emarginata, subacuta. *Ceroma* nudum. *Malæ*, *Gula*, *Jugulum*, implumes. *Ungues* acuti.

IBYCTER.—Vieill.

{ *aquilinus*. *Gmel*. Pl.
Enl. 417. Nat. Mis.
pl. 485. Gal. des
Ois. pl. 16.

Rostrum superne convexum. *Mandibula* inferior subtus angulosa, ad apicem emarginata, obtusa, *Ceroma* pilis aspersum. *Orbitæ*, *Gula*, *Jugulum* implumes. *Ungues* acuti.

DAPTIRIUS.—Vieill.

{ *ater* *Vieill*. Pl. Col.
37. Gal. des Ois.
pl. 5.

Rostrum superne compressum. *Mandibula* inferior integra, obtusa. *Ceroma* hispidum, grande. *Malæ*, et *gula* implumes. *Jugulum* lanosum.

POLYBORUS.—Vieill.

{ *Braziliensis*. *Ray*.
Gal. des Ois pl. 17.
degener. *Ill*.
Novæ Zelandiæ.
Lath. Syn. p. pl. 4.
col. 192. juv. 224.

Rostrum superne rotundatum. *Ceroma* hispidum. *Nares* lunulatæ, ad marginem superiorem membranaceæ. *Tarsi* nudi. *Acrotarsia* rigide squamosa, reticulata. *Digiti* liberi, externus versatilis. *Ungues* æquales, subtus rotundati. *Remex* 2dus longissimus.

PANDION.—Sav.

{ *haliaetus*. *Auct*. Pl.
Enl. 414. Wils.
Americanus. *Vieill*.
Gal. des Ois. pl. 11.
Wils. Am. Orn. p.
37. f. 1.
Ichthyæetus. *Horsf*.

Rostrum superne convexum. *Nares* lunulatæ, transversæ. *Ceroma* subhispidum. *Tarsi* semiplumati. *Acrotarsia* scutellata. *Digiti* liberi, externus versatilis. *Ungues* inequales.

HALIÆTUS.—Sav.

{ *leucocephalus*. *Linn*.
Pl. Enl. 411. juv.
112. 415. Wils.
Am. Orn. pl. 36.
Pondicerianus. *Lath*.
Pl. Enl. 416.
blagrus. *Daud*. Le
Vaill. Ois. d'Afr.
pl. 5.
vocifer. *Daud*. Le
Vaill. Ois. d'Afr.
pl. 4.
vulturinus. *Daud*. Le
Vaill. Ois. d'Afr.
pl. 6.
macei. *Cuv*. Pl. Col.
8. juv. 223.
leucogaster. *Lath*.
Pl. Col. 49.

Rostrum superne convexum. *Nares* lunulatæ. *Ceroma* subhispidum. *Tarsi* elongati nudi. *Acrotarsia* reticulata. *Digiti* breves: externus cum medio ad basin connexus. *Ungues* breves subæquales.

CIRCÆTUS.—Vieill.

{ *brachydactylus*. *Auct*.
Pl. Enl. 413.
cinereus. *Vieill*. Gal.
des Ois. pl. 11.

Stirps Aquilina continued.

Rostrum superne subangulare. *Nares* rotundatæ. *Ceroma* subhispidum. *Tarsi* usque ad digitos plumati.

AQUILA.—Auct.

Rostrum superne convexum. *Mandibula* superior subdentata. *Nares* semilunares transversæ. *Tarsi* elongati, fortissimi, ad basin plumati. *Acrotarsia* scutellata. *Ungues* longi, fortissimi, acuti.

HARPYIA.—Cuv.

Rostrum superne convexum. *Nares* elliptici. *Tarsi* elevati, subgraciles. *Acrotarsia* scutellata. *Digiti* subbreves. *Ungues* acuti.

MORPHNUS.—Cuv.

**Alæ breves

Rostrum superne convexum. *Nares* subclausi, rimæformes. *Tarsi* breves, semipalmati.

CYMINDIS.—Cuv.

Rostrum superne convexum. *Nares* lunulatæ. *Tarsi* breves subgraciles. *Ungues* longi, acutissimi.

ASTURINA.—Vieill.

heliaca. Sav. Ois. d'Egypte, pl. 12. Pl. Col. 151. juv. 152.
chrysaeta. Linn. Pl. Enl. 409. fem. 410.
nævia. Linn.
bellicosa. Daud. Le Vaill. Ois. d'Afr. pl. 1.
fucosa. Cuv. Pl. Col. 32.
pennata. Lath. Pl. Col. 33.
Malaiensis. Reinw. Pl. Col. 117.

imperialis. Pl. Col. 14.

* *tarsis* nudis.
Guianensis. Daud. urubitinga. Linn. Pl. Col. 55.
** *tarsis* plumatis.
occipitalis. Daud. Le Vaill. Ois. d'Afr. pl. 2.
ornatus. Daud. Le Vaill. Ois. d'Afr. pl. 26.
albescens. Daud. Le Vaill. Ois. d'Afr. pl. 3.
maculosa. Vieill. Ois. d'Amer. Sept. 3. bis.

* *acrotarsiis* scutellatis.
hamatus. Ill. Pl. Col. 61. juv. 231.
** *acrotarsiis* reticulatis.
Cayennensis. Gmel. Pl. Enl. 473. Pl. Col. 270.
uncinatus. Pl. Co. 103. fem. 104. juv. 115.
coronatus. Azara. Pl. Col. 235.

cinerea. Vieill. Gal. des Ois. pl. 20.

§. 2. *Stirps Accipitrina.*

Rostrum breve. *Tarsi* mediocres. *Acrotarsia* reticulata. DÆDALION.

Rostrum breve. *Nares* sub-ovales. *Tarsi* mediocres. *Acrotarsia* scutellata. ASTUR.—Auct.

Rostrum breve a basi aduncum. *Alæ* breves. *Remiges* 4tus longissimus.

Rostrum breve. *Nares* sub-ovales. *Tarsi* elongati, glabri. *Acrotarsia* scutellata, suturâ vix discernendâ.

Rostrum breve. *Mandibulæ*, superior fortiter bidentata, inferior bis emarginata. *Tarsi* mediocres. *Acrotarsia* scutellata. *Remiges* 3tus et 4tus longissimi, æquales.

ACCIPITER.—Auct.

HARPAGUS.

{ *melanops.* *Lath.* Ind. Orn. 1. 37.
cachinnans. *Linn.* Gal. des. Ois. pl. 19.

{ *palumbarius.* *Linn.* Pl. Enl. 418.
 Novæ Hollandiæ.
Lath. White's Voy. hemidactylus. *Temm.* Pl. Col. 3.
gracilis. *Temm.* Pl. Col. 91.
nitidus. *Lath.* Pl. Col. 87. juv. 294.
xanthocorax. *Temm.* Pl. Col. 92.
brachypterus. *Temm.* Pl. Col. 141. juv. 116.
magnirostris. *Gmel.* Pl. Enl. 460. juv. Pl. Col. 86.
radiatus. *Lath.* Syn. sup. pl. 121. Pl. Col. 123.
poliogaster. *Natterer.* Pl. Col. 264. juv. 295.

{ *fringillarius.* *Ray.* Pl. Enl. 412. 467.
torquatus. *Cuv.* Pl. Col. 43. juv. 93.
velox. *Wils.* Am. Orn. pl. 45. f. 1.
Pensylvanicus. *Wils.* Am. Orn. pl. 46. f. 1. juv. Pl. Col. 67.
virgatus. *Reinw.* Pl. Col. 109.
pileatus. *Pr. Max.* Pl. Col. 205.
soloensis. *Horsf.* Pl. Col. 129. juv. 110.
musicus. *Daud.* Le Vaill. Ois. d'Afr. pl. 27.
gabbar. *Daud.* Le Vaill. Ois. d'Afr. 33. Pl. Col. 122. juv. 140.
minullus. *Daud.* Le Vaill. Ois. d'Afr. pl. 34.

{ *bidentatus.* *Lath.* Pl. Col. 38. juv. 228.
diodon. *Temm.* Pl. Col. 198.

§. 3. *Stirps Falconina.*

Rostrum breve. *Mandibulæ*, superior fortiter bidentata, inferior simpliciter emarginata. *Tarsi* mediocres. *Acrotarsia* scutellata. *Alæ* breves. *Remex* 2dus longissimus, leviter interne prope apicem emarginatus.

IERAX.

{ *cærulescens*. *Linn.*
Edw. pl. 108. Horsf.
Zool. Research. Pl.
Col. 97.

{ *frontalis*. *Daud.* Le
Vaill. Ois. d'Afr. pl.
28.
chicquera. *Daud.* Le
Vaill. Ois. d'Afr. pl.
30.
tibialis. *Daud.* Le Vaill.
Ois. d'Afr. pl. 29.
sparverius. *Linn.* Pl.
Enl. 444. fem. 465.
Wils. Am. Orn. pl.
32. f. 1. fem. pl. 16.
f. 1.

{ *tinnunculus*. *Linn.* Pl.
Enl. 401. juv. 471.
rupicolus. *Daud.* Le
Vaill. Ois. d'Afr. pl.
35.

{ *punctatus*. *Cuv.* Pl.
Col. 45.
femoralis. *Temm.* Pl.
Col. 121.

{ *islandicus*. *Linn.* Pl.
Enl. 462. juv. 210, 446.
subbuteo. *Linn.* Pl.
Enl. 432.

{ *æsalon*. *Gmel.* Pl. Enl.
447. juv. 468.
rufipes. *Bechst.* Pl.
Enl. 431.

{ *peregrinus*. *Linn.* Pl.
Enl. 430. juv. 470, 469.
severus. *Horsf.*
tinnunculoides. *Natter.*

Rostrum breve. *Mandibulæ*, superior fortiter dentata, inferior emarginata. *Acrotarsia* reticulata. *Remex* 2dus longissimus, primus et secundus prope apicem internè fortiter emarginatus.

FALCO.—Auct.

§. 4. *Stirps Buteonina.*

Rostrum breve. *Mandibulæ*, superior subdentata, inferior emarginata. *Tarsi* breves debiles. *Acrotarsia* scutellata. *Alæ* longæ. *Remex* 3tius longissimus.

ICTINIA.—Vieill.

{ *plumbea*. *Lath.* Vieill.
Ois. d'Am. sept. pl.
20 bis. juv. Pl. Col.
180. *Lath.* Syn. Ed.
2. pl. xii.

Rostrum mediocre. *Nares* subovales. *Tarsi* elongati. *Acrotarsia* scutellata. *Digitis* plerumque breves. *Remex* 3tius longissimus. *Capitis* latera plumarum circulo instructa, disco capitali *Strigum* persimili.

CIRCUS.—Auct.

{ *aruginosus*. *Aldrov.* Pl.
Enl. 460. juv. 424.
pygargus. *Linn.* Pl.
Enl. 459. juv. 443, 480.
cineraceus. *Mont.* Gal.
des Ois. pl. 13.
acoli. *Daud.* Le Vaill.
Ois. d'Afr. pl. 21.

Stirps Buteonina continued.

Rostrum mediocre. *Lorum* plumis serratis tectum. *Tarsi* mediocres, semiplumati. *Acrotarsia* reticulata. *Remex* 3tius longissimus.

PERNIS.—Cuv.

Rostrum mediocre, subdebile. *Nares* subrotundatæ. *Tarsi* breves. *Acrotarsia* scutellata. *Remex* 4tus longissimus.

BUTEO.—Auct.

melanoleucos. *Daud.*
Le Vaill. Ois. d'Afr.
pl. 31.
palustris. *Pr. Max.* Pl.
Col. 22.
rutilans. *Licht.* Pl. Col.
25.

capivorus. *Linn.* Pl.
Enl. 420. juv.
ptilorynchus. *Temm.*
Pl. Col. 44.

* *tarsis* nudis.
tachardus. *Daud.* Le
Vaill. Ois. d'Afr. pl.
19.
Jackal. *Daud.* Le Vaill.
Ois. d'Afr. pl. 16.
busarellus. *Daud.* Le
Vaill. Ois. d'Afr. pl.
20.
buson. *Daud.* Le Vaill.
Ois. d'Afr. pl. 21.
tachiro. *Daud.* Le
Vaill. Ois. d'Afr. pl.
24.

vulgaris. *Auct.* Pl. Enl.
419.

pterocles. *Temm.* Pl.
Col. 56. juv. 139.
pæcilonotus. *Cuv.* Pl.
Col. 9.

borealis. *Wils.* Am.
Orn. pl. 52. f. 1.
Leverianus. *Wils.* Am.
Orn. pl. 52. f. 2.

** *tarsis* plumatis.
lagopus. *Linn.* Le Vaill.
Ois. d'Afr. pl. 18. juv.
niger. *Wils.* Am. Orn.
pl. 53. f. 1. 2.

§. 5. *Stirps Milvina.*

Rostrum mediocre, debile, compressum. *Tarsi* breves, semiplumati. *Acrotarsia* reticulata. *Ungues*, medio excepto, internè rotundati. *Remex* 2dus longissimus, 1mus et 2dus fortiter interne emarginatus.

ELANUS.—Sav.

Rostrum mediocre, a basi subaduncum. *Cauda* furcata.

Rostrum mediocre, debile, superne subangulare. *Nares* obliquæ, ellipticæ. *Tarsi* breves. *Acrotarsia* scutellata. *Alæ* longissimæ. *Remex* 4tus longissimus. *Cauda* furcata.

MILVUS.—Auct.

melanopterus. *Daud.*
Le Vaill. Ois. d'Afr.
pl. 36. 37. Leach Zool.
Mis. vol. iii. pl. 122.
furcatus. *Linn.* *Wils.*
Am. Orn. pl. 51. f. 2.
Riocourii. *Vaill.* Pl.
Col. 85.

ictinus. *Sav.* Pl. E n
422.

ater. *Linn.* Pl. Enl. 472.
juv. Le Vaill. Ois.
d'Afr. pl. 22. *Sav.*
Ois. d'Egypte.

On looking back to the characters that have been particularized as tending to distinguish the foregoing groups, it is evident that they differ considerably in their relative importance: some being strong, prominent, and ostensible, while others may be considered as comparatively of inferior moment. How far the latter are of sufficient consequence to form a ground for generic distinction is a question which I should prefer to propose to others, rather than attempt at present to determine myself. It is difficult indeed to lay down any rules for deciding what would generally be allowed to be a true generic difference. Much of course must depend upon the nature of the group to be subdivided, and much also upon its extent. The species of some groups, though considerable in point of number, are yet often so uniformly characterized, that it is not easy to seize upon any ostensible peculiarity that divides them. Here where the extent calls for subdivision, and yet where no apparently important or distinctive character is observable, it becomes a question, whether it may not be expedient to seize upon any character that is at all tangible, for that necessary purpose, even though it may at first sight appear of inferior consequence. Generally speaking I confess myself an advocate for all such subdivisions; and chiefly for the reason, that it is impossible for us to form a determination respecting the importance of any character of which we know not the actual use. What may appear to us trivial may in reality tend to some material purpose. The cylindrical *ungues* of *Pandion*, and *Elanus*, for instance, or their reticulated *acrotarsia*, though to us apparently indicating nothing important to the economy of the bird, may yet be conducive to some material function unknown to us. And indeed when we consider the fact, that these and similar characters, are not to be found indiscriminately attached to the groups of the *Falconidæ*, but united together with considerable appearance of regularity and design, we should feel less confidence in asserting their want of importance. But the question of what actually constitutes a generic difference is one which requires more attention than can be bestowed upon it in a mere casual reference. I hope hereafter to be able to enter more carefully and more at large upon the subject. In introducing at present those genera into the foregoing

table which may at first sight be considered doubtful as to the importance of their distinguishing characters, I feel myself perfectly justified in the reflexion that they have been established by naturalists of the highest authority in the science, upon whose general acumen and accuracy it is almost superfluous for me to affirm that I have every inclination to rely.

But though there may be some difference of opinion respecting the sufficiency of those apparently minour peculiarities for forming the groundwork of generick distinction, there can be no hesitation, I should presume, in admitting the validity of those stronger characters which distinguish the more prominent groups. In general, perhaps, those points of distinction may be considered of doubtful validity, which are novel, or not hitherto employed for the purpose of separation: but we may venture, I fancy, to take it for granted, that a character which has at all times, and by all persons, been actually employed in drawing a line of demarcation between great and leading groups in Ornithology, is of a nature sufficiently explicit and prominent to be again employed for a similar purpose. If therefore we can adduce an instance in which such a decided and generally admitted mark of distinction exists in the groups of which I have just treated, it appears to me that the separation of them by such a character may be allowed even by those who are the least willing to concede the point. It may be observed then, that, in the great series of genera into which Linnæus has disposed the Class of Birds, the character of a notch in the upper mandible is employed as a prominent ground of distinction. His genera *Muscicapa*, *Lanius*, *Turdus*, and others, are at once characterized by this leading peculiarity. In the formation of groups of even still higher rank, the notched bill is still admitted as a decisive mark of separation; and the "Dentirostres" of M. Cuvier, the "Insectivores" of M. Temminck, and corresponding groups of other naturalists are founded on this strong character alone. The reason is evident. The apparent dentation of the bill formed by this notch is indicative of the raptorial habits of the bird and its animal food. It is this character which exhibits the analogical relation that exists between the *Insectivorous* Tribe of the *Insessores* and the true *Birds of Prey*. And

it is the same character which still further points out the analogy that so strikingly forces itself upon our notice, between the *Birds of Prey* and the *Carnivorous Mammalia*. The bill of a bird, it is true, can but ill represent the strong developement of the teeth that belongs to the *mammiferous* animals: but as far as it is possible, the notch preserves the character by exhibiting at least the rudiments of it in an analogical structure. If then we are satisfied with this striking character as a mark of distinction between universally admitted genera, or even still more comprehensive groups, and solely on account of its being indicative of the habits of rapine, surely we can not hesitate to adopt it as a mark of generick distinction among the birds of rapine themselves. It is unnecessary to add, that this character is found to distinguish the true *Falcons* from the rest of the family, and to exist among them even in a more perfect state of developement than in the admitted groups to which I have alluded. I say nothing here of the other strong points of distinction both in form and manners that are uniformly found united with it in the same genus of *Falco*: the single character of the notched bill is all that I insist on. If we do not admit it here as a sufficient generick distinction, we must equally reject it as such in the divisions that it has hitherto characterized, without a doubt as to its validity.

I dwell the more upon this point, as the great difficulty which we have to combat in the present state of the science in this country, respecting the separation of the *Falconidæ*, is the positive denial on the part of those who oppose the modern views on the subject, of the possibility of separating the family at all. The species, it is confidently asserted, exhibit no distinctive character, they differ no wise but as species, they are all indiscriminately *Falcones*. If I have succeeded in pointing out even one decisive characteristick of distinction, my point is gained, and the separation of the group must follow. The centre of opposition is forced, and the minour positions will fall in of course and in detail. In truth, I know no groups in Ornithology, which are united in one family, more decisively characterized as separate, than those before us; nor any, where the marks of distinction are more immediately recognised even by the common observer. I will

venture to assert, that were we to place specimens of a hundred species of the family in the hands of an intelligent observer, unacquainted with any scientific views, and unbiassed by any systematic mode of distribution, he would invariably assign them their natural stations among the leading groups I have laid down, separating them respectively as *Eagles*, *Hawks*, or *Falcons*, *Buzzards*, or *Kites*.

I am aware that high scientific authority may be adduced to impugn my opinions on this subject. But the argument *ad verecundiam* is one which should be sparingly used, or used only where it may not be turned against him who employs it. If I may feel a diffidence in setting my opinions in array against those of M. Temminck, so strongly, so constantly, so authoritatively expressed on these points, I assume some confidence when I find myself supported by the influence of such names as those of MM. Cuvier and Savigny. I would have no hesitation indeed in appealing to this very tribunal of authority. The preponderance would decidedly be on my side. Every man of science that has written on this subject before the days of Linnæus, and the greater portion of those who have entered upon it since his days, and who have not been restrained by the strict dictates of his followers, have uniformly concurred in separating the groups before us; differing, it is true, in the mode, and the extent, but all of one voice as to the principle. Nay even the authority of Linnæus himself I am not inclined unconditionally to surrender. Although my views may appear to run counter to the letter of his instructions, I am confident they accommodate themselves to the spirit: and I do not hesitate to assert, that when judiciously examined, and faithfully interpreted, his principles of classification will be found to be not altogether at variance with those of the more liberal of our modern schools. If we look even higher than to the present æra of science, we shall find that the voice of antiquity is in favour of the separation of these groups. We have already seen* that Pliny has divided the species of the *Falconidæ* into the tribes of *Aquilæ* and *Accipitres*; and we may add that Aristotle, the father of Zoology, has equally separated them into

* p. 326, and 328. note.

the divisions of *Αετοί*, *Ιερακες*, and *Ιετινιοί*: while both those naturalists have again subdivided these leading groups into divisions not altogether dissimilar to those of the present day.

I feel less confidence, I must confess, in advancing these opinions, when I recollect that they do not meet the approbation of some of my most valued friends, and fellow labourers in this department of science. But while I cannot but regret the difference of opinion that exists between us, I am aware of the cause from which their disapprobation originates, and feel less hesitation in continuing to incur it. They have in fact attained by different views an eminence in science which it is easier to look up to, than to attain. And it is natural that they should consider those efforts as superfluous, which profess to simplify a science, the mysteries of which they have already unravelled. But they should remember that others are not equally favoured with themselves, and that every assistance that can be afforded those who are struggling onwards in the same paths must be of some importance. They should moreover reflect that those who unite in the endeavour to promulgate in this country the modern views of the science, do not wish to interfere with any established notions, or to supersede any opinions of others. It is their wish only that their own views may have equal liberty of being made known; that the voice in which they speak may not be overpowered at once by the weight of influence, or deadened by the force of authority;—that it may, in short, be allowed to be heard. In investigations like the present, where there is a diversity of opinion, it is of little consequence who is right, or who is wrong. When we consider the limited powers which the best of us can bring to such subjects, the probability is that we are all wrong together. The object before us is Truth; and in the search of this hidden treasure, no assistance should be despised which may tend to lay open the depths in which it lies. The present moment appears most propitious for the attainment of this common object. Greater dignity has of late been conferred on the study; greater interest been excited in its behalf; and a favourable concurrence of circumstances holds out the promise that the investigation of nature will be henceforth carried on with a zeal and enterprize that must eventually ensure success. In

furthering this wished for object it is of consequence that unanimity should prevail, and every additional aid, however differing in mode or quality, should be invited into the common service. The spirit of inquiry has gone forth, and the true and disinterested well wisher of the science should hail with triumph every light that may illuminate its progress, and every effort that may speed it on its way.

[*To be continued.*]

Art. XLIV. *An Inquiry respecting the true nature of Instinct, and of the Mental Distinction between Brute Animals and Man.—Essay II.—An Examination of the prevailing division of the Brute Powers into Intellectual and Instinctive, as presented, in some recent publications, by the Rev. Dr. Fleming, and by M. Frederic Cuvier; including Strictures on the Theory of Habit proposed by the latter: with illustrations of the Specific Constitution of the Brute Mind.* By JOHN OLIVER FRENCH, Esq.

[Continued from page 173.]

There is then a marked analogy, though no affinity, between human habit and that class of brute instinct which may, from its uniformity, be usefully distinguished by the term *invariable* instinct. In this instinct, and also in human habit, there appears to be *essentially* an intelligent power, however in the case of Man this power may be perverted or misdirected: here then is the ground of analogy. But the essential intelligence in human habit, however it may be warped or perverted by the disorderly proneness of the will, or a wrong education, and employed in the production of disorderly acts, (a circumstance arising from man's freedom,) is a proper attribute of Man; as is proved by the different developement and formation of the human compared with the brute mind; and this may be illustrated satisfactorily by

comparing them in this respect:—whereas the essential intelligence of *invariable* instinct, is *not* proper to the brute, but takes the form, in his conscious mind, of simple intuitive perception, which he is at no pains to analyse; being possessed of no competent faculty to enable him to reflect upon it. There is therefore in the consciousness of Brutes, with respect to this intelligence, no affinity with human consciousness. Thus while a child from the exertion of its proper intelligence *acquires* the idea, the ability, of balancing the fluid in its spoon; the Antlion, from *communicated perception*, or instinct, performs a similar equilibrium with sand, *as if by habit*.* This perception may be said to be *influent* and *transfluent*: it does not proceed from the proper intelligence of the creature, but is *derived from a superior principle*, to which it is merely *analogous*; it is thus *influent*:—and it is not fixed by any reflection exerted upon the essential nature of its discriminations, considered *objectively*;—or viewed from any principle of intelligence,—either before or subsequent to the act; but it passes off *in* the act: it is thus *transfluent*. Proper intelligence is thus inconsistent with this species of instinct; yet the latter is nevertheless not mechanical; since the intuitive perception itself forms a ground of *consciousness of action*; and constitutes the basis of a middle conscious nature, between mere irritability, (which is an inferior effect of life, related analogically to consciousness,) and the intellectual consciousness of man. It is then most evident, that a distinction must be taken between essential principles of action and the conscious nature of the being in which such essential principles are *derivatively* exhibited.

* See Introductory Essay; Zool. Journ. No. 1. p. 24.

How exclusively the human mind is left to acquire ideas of relation in freedom, where the means of acquiring them are afforded; and how few and barren those ideas are where the means of improvement are wanting; is made evident by the facts related of Wild Men, or individuals who have been fortuitously reared apart from the society of their fellow creatures, in woods and unfrequented districts. The well known history of Peter the Wild Boy, with that of the Savage of Aveyron, and others, afford striking illustrations of the truth of the proposition, that the rational intelligence of man is different *in kind* from the apparent intelligence of the brute.

Occasion will arise, in the course of the present inquiry, for a particular examination of the various facts of this nature which have been recorded.

Influent intuitive Perception then, thus defined, I take to be the *efficient, conscious, or immediate cause* of invariable or uniform instinct; and that it is the real cause appears from a candid survey of the various parts of the economy of animals; but in none is it more substantially exemplified than in the facts attendant on migration. The late Dr. Jenner in an elegant paper recently published in the Philosophical Transactions, observes upon this subject, when treating of the changes which take place in the generative organization of birds previous to their migrating;—"At the coming on of spring we observe our more domestic birds, those that approach our houses, and are most familiar to us, assuming new habits. The voice, gesticulation, and the attachment which the male begins to shew to the female, plainly indicate some new agency acting upon the constitution. This newly excited influence, which so conspicuously alters the habits of our birds at home, is, at the same time, exerting itself abroad upon those which are destined to resort hither. *It is the preparation which 'nature' is making for the production of an offspring by a new arrangement in the structure of the sexual organs.* No sooner is the impulse arising from this change sufficiently felt, than the birds *'are directed'* to seek a country where they can for a while be better accommodated with succours for their infant brood, than in that from which they depart."

The question here presents itself,—What is Nature? or rather, what is that principle or cause within Nature (for the change of the generative organization can itself be considered only as an effect,) which is making this preparation?—is it something material? If it be material, then matter is essentially intelligent, for it then acts according to design, without the aid of any guiding power: but leaving this as absurd;—if the principle, or cause alluded to, be mental, it must be referred, in the case we are considering, either to the immediate operation of the Deity himself, or otherwise to the operation of the intermediate influence or agency to which our attention was directed in the first of these Essays. It is however here to be distinctly attended to, that the reality of the operation of such intermediate influence or agency by no mean rests upon the supposition, or necessarily requires,

an actual consciousness in the beings or agents from whom it is supposed to emanate, of each particular experience and action of the beings which are the subjects of its operation. That the contrary may indeed be the case, will become sufficiently evident by reflecting for a moment upon the nature of the influence of one human mind upon another. Every Man is conscious of exercising such an influence; but he is unconscious of the peculiar modes in which others are affected by it, or the particular actions which in them may be induced by it. This species of operation is moreover manifested according to the *law of continuity* or *affinity*, and according to the strength of the operating influence, and the faculty of reception, mutually, between the respective subjects of Nature:—is it not therefore reasonable that we should expect to find a similar operation of mutual influence and reception established, according to the *law of analogy*, between the superior intelligences existing in a more immediate connection with the Deity; and the Kingdoms of Nature? and that this influence would descend into Nature, *by proper mediums*, and produce those remarkable displays of Power derived from Intelligence, which the non-rational Creatures so strikingly exemplify? It is moreover consistent with Wisdom that nothing should exist for itself alone, or independantly of things both above and below itself; and thus that the highest orders of existing beings should have an active relation to, and be instrumental in promoting, the extended designs of Universal Creation. Utility is the Law of Life, and Life without Utility is a proposition which is contradicted by every thing which surrounds us.* It is impossible

* Mr. W. S. Mac Leay, in his *Horæ Entomologicæ*, notices a theory in which the brain of the lower animals is supposed to be acted upon by the volition of the Deity; in connection with which, and as the foundation of the opinion itself, he alludes to the final cause of Creation,—use and instruction to man,—adverted to towards the conclusion of this Essay. On this theory he remarks, “We can perhaps conceive that the Deity should be the cause of their actions; but what can be their passive principle? The Deity cannot surely be the percipient.” This objection, though perfectly valid in respect to the above-mentioned theory, is inapplicable to the view of the brute nature now attempted to be elucidated, which supposes mediate powers influencing a lower conscious nature. Brutes have their freedom, although it is not an intellectual free-

to overlook the influence of intelligence in the case before us; for if we could suppose the animal constitution to be wound up, if I may be permitted the expression, so as to cause the fibres to act like the alarum of a clock, at a given point of time, and thus were to account mechanically for the change alluded to in the generative organization of migrating birds; it would be natural to expect that the connubial compact,—not the departure of the bird to a distant part previously to forming it,—would be the immediate consequence: how the perception of their ordinary course of conduct, to insure a proper provision for the young by a distant flight, can be the effect of any physical excitement of the sexual organs, it is impossible to conceive:—such a supposition is, in fact, negatived, by the circumstance of the young birds migrating from the spot which gave them birth, without any such physical change happening in *their* bodily economy.

“One of the most singular occurrences,” observes Dr. Jenner, “in the history of migration, is the mode of departure of the young birds from the country where they were produced. It may be conceived that the bird which had once crossed the Atlantic, or any other ocean, might have something impressed upon it that should prove an inducement to its return; but this cannot be an incitement to the young one. The identical bird, which but a few weeks before burst from the shell, now unerringly finds, without any apparent guide, a track that leads it safely to the place of its destination, perhaps in many instances over the widest oceans:” and at the conclusion of his paper he recapitulates this statement by saying “that the departure of the young birds is not guided by the parent, but the result of an ‘*unknown principle*.’”

I cannot help viewing, in these particulars, the effects of a perception which appears as it were shed into the animal mind, according to requirement, and for the fulfilment of actions necessary to be accomplished: and I think I am supported in my conclusion by the nature of some other facts observed, as dom:—in respect to locomotion and actions indifferent in themselves, brutes are free; and they no doubt enjoy a species of consciousness such as this kind of freedom is calculated to bestow: they have thus a sentient principle, or plane of re-action, although of a different kind from that of man: the Deity, therefore, is not the percipient.

well as the inferences drawn from those facts, by the acute observer to whose sagacity we owe them; such for instance as the reserve of individuals to fill up the casualties of bereavement;* and the remarkable circumstance, that “both the summer and winter migrating birds are, on their arrival here, well received by the domestic natives, and neither create quarrels nor excite fears. The redstart builds its nest in the same tree with the titmouse, and the redwing feeds peaceably in the same meadow with the starling.” To these may be added accidental or contingent migration, as in the case of the Fieldfare, so clearly established by Dr. Jenner, who, after correcting a very generally adopted, but erroneous opinion, of the Redwing’s and the Fieldfare’s feeding upon the haw, or fruit of the whitethorn, proceeds to observe—“The occasional departure of these and some other winter birds during a long continued frost, must be very obvious. The greater number disappear soon after its commencement, if it sets in very severely: some few are always left behind and are soon starved, if not fortunately relieved by a thaw. Those that are driven to this necessitous migration, probably pursue a track that quickly leads them out of the reach of frost. Of these flights I shall produce instances, which render it probable that they are able even to outstrip its course.

* “Should a fatal accident befall either the male or female bird after this [the connubial] alliance is newly formed, no time is lost in unavailing sorrow, nor any great nicety shown in forming a new connection, as the following little history will evince. A pair of Magpies began to build their nest in a gentleman’s garden at Burbage, in Wiltshire. Disliking their familiarity, he shot one of them from an ambush made for the purpose. The next day there were again a pair going on with the work. One of these was also shot. The loss was not long in repairing; for the day following the pair were again complete, when another fell a victim to the gun. Thus the gentleman went on destroying one of them daily until he had killed seven; but all to no purpose—the remaining Magpie soon found another mate. The nest was finished, and young ones were produced, which were suffered to fly. This is an extraordinary fact.—It seems to show that nature has a reserve of birds in an unconnected state, immediately ready to repair losses. Were the whole to pair at once, the circumjacent country might be insufficient to furnish food for the immense number of young ones that must burst forth at the same time.”—

Phil. Trans. for 1824. Part 1, p. 21.

“The approach of intense frost is often to a certainty made known to us by the appearance of a numerous tribe of Water-Birds, some of which are rare, and seldom show themselves here on any other occasion. We commonly see them three or four days prior to the setting in of very severe frosty weather. This was manifest at the latter end of the year 1794, at the coming on of the severe season that ensued. In the river Severn, about a mile and a half to the westward of this place, [Berkeley, Gloucester.] were seen and taken many species of Water-Birds, that generally confine themselves to the more northern regions. Far more pleasant is it to see during the continuance of hard frost, the return of those birds which had left us at the beginning. These are pleasant omens, and most certainly forebode a thaw. The following example shows how soon they catch the first opportunity of again seeking those countries from which they were so lately driven by necessity. The day preceding the thaw, the frost being then intense, a gentleman who was shooting observed a large flock of Field-fares, birds that are extremely common here in milder weather. They were as much untamed as if no frost had appeared in our island. He had the good fortune to shoot one of them, which was brought to me. I found it as fat and plump, and in every respect in as good condition, as if it had remained here undisturbed, and had found provision in the greatest plenty, though it was without a particle of food in its stomach. Its last meal was digested; and the frost still remaining, it could find no food for its present support. Now it is very obvious that this bird, and its companions, must have taken a long flight, and probably in a very short space of time; for the intense frost, that was of such duration and so severely felt here, extended far into the more southern parts of Europe, beyond which they must have resorted for that plenty of food which gave plumpness to the one I examined, and doubtless to the whole flock, from their appearing so wild and vigorous. It clearly appears, that in their flight they exceeded the progress of the thaw, as the northern birds did that of the frost. This thaw, though it was again succeeded by frost, came on very rapidly, and occasioned, by the sudden melting of the snow, those destructive

inundations through the kingdom, that will not readily be forgotten.

“This account of the Field-fare sets the fact of migration, though from an accidental cause, beyond the reach of doubt. There was no support for it here ; the ground was deeply covered with snow, and the intense frost, by its long duration, had destroyed every thing that could afford it succour ; it must, therefore, have taken a long flight from this country, and returned to it again at the approach of temperate weather.”

All the lower animals possess invariable or uniform instinct in greater or less degrees : let us therefore consider what results are involved in the admission that they possess a mixed nature, including, besides this species of instinct, a portion of proper essential intelligence, enabling them to form conclusions by free agency. What would be the inevitable consequence of such a mixture of principles,—but that the instinctive part of their nature would be, sooner or later, annihilated ; or, at least, perverted ? Could this free principle be confined to this or that act ?—would it not, like a newly created luminary, dart its penetrating rays through every lower principle, and elevate its subject to the consciousness of Man ?—*Would not the Brute regard his own instincts from this principle*, in the same manner that Man, who possesses it, regards his natural appetites, and desires ?—Would not the Brute take a survey of his lower powers, and would he not, as man does, either rightly use or pervert them, as he pleased ? were they thus made *objective* to him ; I really do not see how an affirmative answer can be withheld. It seems most evident that any conscious principle of intelligence must be *essentially free* in its nature ; and that if brutes could act from it at all, they must be allowed the faculty of reflection ; and this granted, their instincts would serve *as a basis for its employment and extension*.

The *Balæna Mysticetus*, L ; or common Greenland Whale,—an animal not deficient in sagacity,—could it but thus regard its instincts in an objective form, would defy the power and stratagems of man. The consciousness of its amazing strength would silence its fears, and it would turn upon its assailants with certain destruction ; or, preferring flight to combat, would outstrip the

velocity of the Ostrich, in an onward course through the briny flood, and render pursuit unavailing. Instead, however, of repelling the attack, it generally dives to an immense depth, where, under a pressure often exceeding 200,000 tons upon its body, it becomes so exhausted, that, on its return to the surface of the sea, it becomes an easy prey. "The conduct of the Whale, in this respect," as Mr. Scoresby observes, "intimates, that the instinctive faculty generally possessed by the lower animals, and employed for the purpose of self-preservation, directs it to descend to the depths of the ocean for escaping its natural enemies in the same element, and it further intimates, that, whatever these enemies may consist of, whether Sword-fish, Thrashers, or Sharks, since it avoids them by this means, it must be able to descend lower, and to sustain a greater degree of pressure from the superincumbent water, than any of the animals that are in the habit of attacking it."* The *Balaena Physalis*, L., which inhabits the same seas, is seldom attempted by the northern whalers, in consequence of its rapid flight when attacked giving little chance of success.† Why is not the sagacity of the former species sharpened by the persecution of man, so as to enable it to pursue the same means of self-preservation so successfully practised by the latter? We have seen in the case of the Fox, when placed under circumstances rendering him more liable to the attacks of man, such a variation of sagacity as might perhaps be attributed by some to an increase of intelligence, but there is in the case now cited, every reason in favour of a similar increase of any supposed intelligence on the part of the Whale: a plain proof that proper intelligence is predicable of neither the one nor the other, and that their perceptions are governed by final causes:—the like is illustrated in the case of the Flamingos, hereafter adverted to; who, though very stupid, on the first approach of human beings to their haunts, had subsequently a perception awakened which enabled them to appoint a sentinel to warn them of danger on the approach of men. The Whale then has no intelligence to assist him in his necessity; it therefore is to be presumed, that neither were the Foxes nor the Flamingos assisted by intelligence properly their own; but by perception.

* Scoresby's Journal of a Voyage to the Northern Whale Fishery, p. 134-5.

† Ibid. p. 420.

Were brutes gifted with a gleam of proper intelligence, there would be no restricting their exercise of it, and it would, in all probability, in the initiatory state of general improvement to which such a principle would give rise, lead the more sagacious kinds sometimes to manifest their talent in a whimsical manner. We might perhaps, in this state of things, hear of Monkeys setting fire to woods, or travellers tents, for the purpose of warming themselves; or the phænomena, not merely of Dancing Dogs, but of Dogs for dancing masters might become familiar: indeed, attributing the actions of the Dog, to proper conscious intelligence, the fable of the “Twa Dogs” who

“Wi’ social nose whyles snuff’d an’ snowkit;
 Whyles mice an’ moudieworts they howkit;
 Whyles scour’d awa in lang excursion,
 An’ worry’d ither in diversion:
 Until wi’ daffin weary grown,
 Upon a knowe they sat them down,
An’ there began a lang digression,
About the lords o’ the creation;”

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must, if we would preserve consistency, be struck out of the list of moral impossibilities.

M. Fred. Cuvier virtually advocates the truth of the view here presented: for it would be impossible for brutes to act in a single instance from essential or proper intelligence, unless they possessed a free principle; and if they possessed this principle, it must include that very attribute of reflection which he is so strenuous in denying them; and which, as we formerly observed, can only be regarded as an attribute of man’s free faculty of intelligence. Upon this subject he beautifully observes:

“Mais, ce qui nous paroît hors de doute, c’est que tous les animaux sans exception sont dépourvus du sens intime de la perception du moi et de la faculté de réfléchir; c’est-à-dire, de considérer intellectuellement, par un retour sur eux-mêmes, leurs propres modifications, ils ignorent qu’ils reçoivent l’impression des corps extérieurs, qu’ils pensent, qu’ils agissent; les actes de leur esprit, comme leur mouvemens de leur corps, n’ont que des causes extérieurs. Dépourvus ainsi de toute connoissance, ils le

sont de toute liberté ; car c'est par l'acte seul que nous apprend à nous connoître, que nous apprenons à vouloir librement." In other words it is by the principle or power of essential intelligence alone, which presents us intellectually to ourselves, that we are enabled to will in freedom. "Si," observes M. Cuvier in continuation, "les provisions que nous voyons faire au Chien étoient l'effet d'une véritable connoissance, c'est-à-dire, si la reflexion lui avoit appris tout ce qu'il auroit fallu qu'il sât, et ce qu'il ne pouvoit évidemment savoir sans elle, pour prévoir et pour agir en consequence, il ne se seroit par borné à faire des provisions de bouche, il un auroit fait pour s'abriter, pour se coucher, en un mot, pour tous ses besoins ; et nous pouvons appliquer ce raisonnement à tous les animaux pourvus d'instinct, et formés de manière à produire ces actions isolées dont l'existence ne peut être conçue par nous qu'autant que nous considérons la perception du moi et la reflexion comme en étant les causes."

Upon these grounds I conclude, notwithstanding appearances to the contrary, which I shall further endeavour to explain, that as in the case of invariable or non-contingent, so in that of variable or contingent actions, brutes do not possess any principle the same in kind with that of human intelligence ; that instead of it, they have influent intuitive perception, analogous to human intelligence and reflection :—thus that there is *Variable or Contingent Instinct* as well as *Invariable Instinct* ; and that the higher animals who exhibit the most perfect types of human affections, are more particularly the subjects of variable or contingent instinct, which gradually becomes less conspicuous as we descend to those classes that exhibit the strongest types of human thought and science ; as in the Insect tribes ; in which the contingent operation of instinct is more rarely manifested. This distinction into variable or contingent, and invariable or non-contingent, it will be readily seen, is a distinction in the acts considered as effects or as appearances merely, and is without reference to the general principle of Instinctive Perception from which they are performed ; and which is essentially the same, however differently modified in different orders of creatures. It is by no means, however, intended to be said, that the conscious principle

of the Insect is formed upon *as high a degree* of Instinctive Perception as that of the Dog : this Perception appears to be in its highest degree, and thus to form the highest conscious nature brutes are capable of, in those animals in whom it is manifested in the *contingent* form ; since the guiding intelligence here operates more tacitly, and apparently with a less forcible power on the conscious mind ; thus leaving to it a stronger analogous approach to freedom and liberty in effecting its discriminations ; as in the Horse and the Dog. Instinctive Perception thus differs *in degree* in its subjects ; but it differs from Proper Intelligence *in kind* : or in scientific terms, and as the converse of a previous statement, the various manifestations of the former, among themselves, are related by *affinity* ; but to the latter by *analogy*.

If the view here taken be consistent with the truth, it will be conformable to experience in Nature. I therefore proceed to examine the principle laid down, in its application to the Brute Memory ; first, however, noticing what the quality of this memory appears to be, in comparison with that of Man.

Memory appears to form the basis of the mental organization, and is common to man and the brutes ; although in the latter it must be differently modified, inasmuch as the ordinary ideas of objects must differ *in their nature*, from similar ideas in man. The principle of proper intelligence, from and by which man acquires and contemplates ideas, is the cause of their possessing an intellectually definite and specific character, different from any quality that can have place in the ideas of brutes : the relations under which ideas are viewed by the latter being thus different from those under which man regards objects, will of course stamp a different quality upon such ideas in the case of the brute ; and the idea of an Ox or of an Ass respecting even those objects most familiar to him, such as a tree, a tuft of grass, or a thistle, must differ exceedingly from the human idea of either of those objects. The ideas of the brute may be called ideas of Simple Perception—those of man ideas of Intelligence.

Now from what has been already advanced, it necessarily follows, that the ideas of brutes must be subjected to the following laws. Their ideas of the past must be all spontaneous, or

excited by present sensations, or other circumstances, independent of any proper will of the animals: in other words, they cannot possess the power of *calling up* ideas, at pleasure; for this would be to grant them reflection: although, all their ideas being in a state of association, the past becomes present, whenever any similar sensation and perception take place.*

The circumstance therefore of their acting, in contingent cases, with propriety, upon ideas of the past spontaneously combined with the present by the law of association, and their doing this

* Since writing the above, I have accidentally perused the opinion of Mr. Forsyth on the Nature of the Animal Memory, which, it will be seen, exactly coincides with the definition above given of this faculty. Mr. Forsyth very aptly remarks, that the spontaneous ideas of brutes may be in some measure estimated by the presumable succession of ideas in the minds of insane persons, in whom however the power of regulating this lower faculty, or of using it aright, seems to be deficient or perverted; whereas in brutes this is not the case, as they never can lose that which they never had. Even mad Dogs, he observes, form no exception to this rule; since their actions, when suffering under hydrophobia, result, not from insanity, but from the pain and sense of suffocation attendant on the disease. This, I conceive, is a very reasonable view of the subject; but it leads directly to the inference that animals, since they have not the intelligence which includes reflection, and are therefore incapable of insanity, in the ordinary sense of the term, must have a principle of perception analogous to it, and resulting from the action of intelligence upon their conscious perception, which, although it does not enable them to *call up* ideas, as above remarked, enables them to regulate them, as they are presented, in a manner analogical to what is rational.

The following incident, witnessed by Mr. Corse, and related by him in the Philosophical Transactions, is highly illustrative of the nature of the animal memory. An Elephant which had escaped, and was subsequently captured in company with a herd of wild Elephants, after an interval of eighteen months, was recognised by one of the drivers. When any person approached the animal, he appeared as wild and outrageous as the other Elephants, and attempted to strike the person approaching him with his trunk; until an old hunter riding boldly up to him on a tame Elephant, ordered him to lie down, pulling him by the ear at the same time; upon which the animal seemed quite taken by surprize, and instantly obeyed the word of command, with as much quickness as the ropes with which he was tied permitted; uttering at the same time, a peculiar shrill squeak, through his trunk, as he had been formerly known to do; by which he was immediately recognized by every person who had ever been acquainted with this peculiarity.—See *Fleming's Phil. of Zool.* vol. i. p. 220.

through the aid of present perception, is in no degree surprising ; any more than is their acting with propriety upon present sensations merely, and without reference to the past :—it is in no degree more surprising than the discriminations effected by invariable instinct. This view exactly coincides with the known truth, that the consciousness of brutes is not formed upon the intelligence essentially necessary to the actions performed by them : the consciousness of a Learned Pig is just the same with that of any other Pig. The acting from experience, if they possessed a power of calling up ideas at will, ought to effect a change in the consciousness of brutes ;—that is, if they reflected, or if they exercised a free intelligence either before, during, or subsequent to the act : for this is the very ground and basis by which human consciousness becomes gradually formed, elevated, and perfected. This is a proof that brutes do not reflect upon their experience, but only perceive it as occasional circumstances operate to bring it present to their minds ; when they act from intuitive instinctive perception accordingly. Led by an influent but transient or transfluent perception of the means, they proceed to the accomplishment of the act ; such perception being accompanied by an instinctive desire or impulse of the will. To give an instance : present sensations, when the Dog observes his master take down his gun, occasion the spontaneous presentation of ideas of the field and the chase ; and the natural desire of hunting is accompanied by immediate perception enabling the animal to act accordingly. If he sees his master put on his hat, his natural desire of social intercourse and companionship is put in action ; perception follows ; ideas of former experience spontaneously present themselves, and if he has formerly, under similar circumstances, been confined, and prevented from accompanying his master, his present perception enables him to evade it, by setting off before hand and joining him on the road : in this case he acts most acutely from immediate perception, in adopting his action to the exigency of the circumstance ; in order to fulfil his desire. In all this, it is evident, that the Dog does not act from proper essential intelligence, but from influent perception ;—he does not *reflect* upon the means which he thus adopts, from or by any higher sphere of

thought. If he reflected before, during, or after the act, or indeed at all, this and similar circumstances would make a fine addition to his stock of knowledge. It would, however, be ridiculous to suppose a Dog, during winter, to indulge himself with anticipated pictures of the next shooting season, and to propose to himself certain improvements in his hunting economy, by reflecting on the events of the season which had past: but which would be a most natural conclusion, if he acted in contingent cases from proper essential intelligence; his memory being at the same time subservient to such intelligence, like that of man.

I therefore conclude that Dr. Fleming is mistaken, when, in drawing inferences from the circumstances just alluded to, he observes, that the Dog who sets off by anticipation to meet his master on the road, and thus escapes confinement, reflects upon "the success which would crown his plan:" I conclude the animal to be actuated by immediate perception, and thence to be merely intent upon joining his master;—that led by an influent perception of the means, he proceeds directly to the act, as far as circumstances will permit; that therefore such means cannot be regarded as "a plan," with respect to the conscious mind of the creature; although he no doubt experiences a sensible delight in the active state of his immediate perceptions and discriminations; in having his social impulse gratified; and would feel pain in its frustration.* "A Partridge," says Mr. White, "came out of a ditch, and ran along shivering with her wings, and crying as if wounded and unable to get from us. While the dam feigned this distress, a boy who attended me saw the brood, which was small and unable to fly, run for shelter into an old Fox's hole, under the bank." If we suppose intelligence on the part of the Dog, as distinguished from instinct, why not on the part of the Partridge? and if reflection as to the means takes place before the act, why not subsequently? in which case both the Dog and the Partridge may be supposed to enjoy a retrospective view of the successful stratagem, and to laugh in their sleeves at the triumph of intellect over force.

It would indeed appear, if we attended to the mere outward

* See Fleming's *Phil. of Zool.* vol. i. p. 224.

acts of brutes, that they actually did form permanent abstract ideas of qualities; and such indeed would be the case were their ideas of quality attained by a free intelligence, and not by instinctive perception. The Dog, however, has evidently no idea of the quality of sociability, nor of that of obedience, any more than the Cat, yet he acts unconsciously from perceptions in which these qualities are essentially present. It cannot be supposed that either the Dog or the Horse reflect upon, or have any abstract ideas of distances, yet by perception they measure their leap, and by the aid of the spontaneous presence of past ideas, which become present to aid the perception for the purpose of immediate action, they correct their errors in this and other instances. A Dog who has to leap a brook, looks for the narrowest part of the stream; his ideas of former leaps spontaneously recur, and by present perception he is enabled even to compare the distance as suited to his ability; this work of comparison he is enabled to effect by a contingent instinct, an influent intuitive perception which passes off into action; nor can he afterwards call up an idea of the act; although whenever similar actual circumstances again induce the presence of the instinctive perception, the identical idea may spontaneously recur to assist the discrimination then to be effected; when the whole process again becomes quiescent. If in the intervals of action spontaneous ideas of sensible objects pass in review in the animal's mind, they are in this state most probably a mere succession of images: it is only when roused to action by some instinctive desire, that the perception necessary for comparison appears to present itself in force. He has no essential knowledge of the relative difference between a brook and a green field,—between a long and a short distance,—between a Hare and one of his own species, although he pursues the former with the most acute discrimination;—between hard and soft, although he distinguishes readily between a piece of meat and a stone.—But an essential knowledge of these differences is the inevitable result of genuine reflection: he *perceives* therefore, but does not *reflect*. The means of accomplishing the end of his nature become present to him in the form of *perception*, *momentarily accommodated to the instinctive desire which is present*, according to its strength

and peculiar modifications; and not by the power of reflection. I can as soon conceive the action of the young Hippopotamus, which, as related by Mr. Bingley,* leapt into the water immediately after it was born, in order to escape the hunters, who had at that instant killed its dam, to proceed from intelligence; as that a Dog should, from this principle, jump into the water to save his master from drowning. There is nothing to justify the conclusion in the one case any more than in the other. But because man himself would act from intelligence in such a case, he is slow to believe that a similar action can be the effect of a contingent instinct; although in such cases as this of the Hippopotamus, he must have recourse to such a principle. Intelligence is however included in all these acts: the question is, not as to its existence; but as to its modification, and whether it be or be not the free property of the agent.

The actions of the whole of the Brute Kingdom appear to be effected by a mode of intelligence, by which the brute is unconsciously assisted to the perception of various relations, in agreement with his nature; and which I have ventured to term, with reference to his consciousness,—*influential, intuitive, or instinctive perception*. The operation from this principle is sometimes so powerful, so acute, and so discriminative, as to exceed any analogous power of the mind of man. In the instances in which this takes place, it surprises by its perfection in this respect.† This however, is transient:—like the vivid meteor, it throws but a

* Anim. Biog. vol. ii. p. 124.

† “Is there not,” (observes Dr. Jenner, after relating several remarkable instances of the power of flight in Birds,) “something as extraordinary in the Pigeon, which can, in a few hours, find out its home, though taken away in a box and totally excluded from the light, to the distance of two hundred miles, as in that bird which quits one shore to seek another, whatever may be the extent of intervening seas? The fact seems to be, that we, the *little lords of the creation*, are too prone to measure the sentient [perceptive, the Doctor might have said,] principle in animals by the scale of our own ideas, and thus, unwillingly allow them to possess faculties which may surpass our own, though peculiarly appropriate to their respective natures; but a little reflection must compel us to confess, that they are endowed with discriminating powers totally unknown to, and for ever unattainable by man.”—*Phil. Trans.* for 1824, part 1.

bright gleam on the darkness which is soon to envelope it;—while the Light of Reason, like that of the Fixed Star, shines with equable and perennial lustre, and whether seen or unobserved. This accounts for the fact that animals exercise, as occasion and their natural dispositions and affections require, the powers of attention, foresight, caution and circumspection, &c. without retaining any consciousness of the nature of those qualities, or knowing any thing about them. It accounts for the fact of the common conscious nature of every individual remaining incapable of elevation: and also for the seeming miracle of migration, both in general, and in some particular instances of it which will hereafter be adduced, in animals not commonly known as migrators. It moreover accounts, in great measure, for that pliability in the nature of animals which renders them susceptible of human influence, and of what is called education.

If intelligence be essentially present in acts purely instinctive, although the agent be not conscious of it, there can be no reason why it should not operate in a *contingent* as well as in an *uniform* manner. To this contingent operation of instinct, upon a connate faculty formed to receive its influence, and not to any rational change, we must, I conceive, attribute the plasticity in the nature of animals:—from this it must arise that the ferocity of some species can be attempered, and the dispositions of others made to yield, and to minister to the necessities, and even to the delights of man. If there is the strongest possible evidence of the subjects of the animal kingdom being supplied with influent perceptions of the means of action, according to implanted faculties of reception; surely nothing more is required to account for the wonderful means employed by them, both in a wild and in a domesticated state.

This indeed, as it respects the higher animals, appears at first sight a circumstance almost of a miraculous character; but it is not in reality more so in the case of such animals, than in the ordinary operations of the Insect tribes, when viewed under a similar aspect.—The instinct of Insects is not so uniform as has been imagined: Bees, although gifted with a perception for distinguishing certain flowers and plants possessing poisonous qualities, some-

times forget their caution in avoiding them, and fall victims to their neglect of the instinctive warning. In the county of West Chester, in the province of New York, a swarm which settled upon the branches of the Poison Ash (*Rhus Vernix*, L.) were on the following morning found dead and swollen.* This and other circumstances demonstrate the subordinate liberty of these minute agents. Their intuitive perception appears to form a plane of reaction analogous to the reason of man; perception is their reason, and they freely exercise their physical powers in accomplishing by its aid the ends of their being; but a slight preponderance of one instinctive desire over another, such as that of gathering honey over that of avoiding the poisonous nectar, whether brought about by the paucity of wholesome flowers or by other circumstances, is sufficient to make them disregard the perception of the noxious quality in favour of that of storing up, and proceeding with their hive work: and the fatal consequence ensues. The stronger instinctive desire, and its relative perception, overcomes the weaker. On this account the instinctive desire of obedience, with its correspondent perception, in the Dog, is so strong, that it will overcome almost every other, even that of the desire of food. In this respect he entirely differs from the Cat, who, though a very sagacious animal, will in general steal in spite of discipline. Intuitive desires, and their perceptions, appear indeed to regulate the actions of animals, according to their prevailing ascendancy; but as the creatures seem to exercise a free controul, subordinate to this, over their bodily acts and locomotions, we are thus enabled to account for every variety of *apparent* voluntary and free determination on the part of the higher animals; whose conscious sense of existence and of action is without doubt formed upon the sentiment of this subordinate freedom. Mr. Bingley relates, on the authority of Catesby, that "When the Europeans first visited America, they found the Flamingos (*Phœnicopterus ruber*, L.) on the shores tame and gentle, and no way distrustful of mankind. When the fowler had killed one, the rest of the flock, instead of attempting to fly, only regarded the fall of their companion in a kind of fixed astonishment: and

* Nicholson's Philos. Journ. XXIII. p. 234.

other and another shot was discharged ; and thus the fowler often levelled the whole flock, without one of them attempting to escape." "Now, however," continues Mr. Bingley, "they regard us with aversion : wherever they haunt, one of their number, it is said, is always appointed to watch while the rest are employed in feeding ; and the moment he perceives the least danger, he gives a loud scream, in sound not much unlike a trumpet, and instantly the whole flock is on wing. They feed in silence ; but, when thus roused, they all join in the noise, and fill the air with their screams."* To those who are disposed to maintain that animals are possessed of a degree of reason, I would address the question, —Is this conduct of the Flamingo an evidence of Reason or of Instinct ? If of Reason, we may as fairly claim it for the young Foxes mentioned in the former part of this Essay, whose vicinity to the abodes of Man awakened a more acute principle of discrimination, even before they had left the litter ; or for the Ants who made choice of the surface of Reaumur's glass bee-hives, *on account of the equability of the heat for hatching their progeny*, and planted their colonies between the surface of the hive and the wooden shutter ;* another instance of particular and contingent adaptation, too strong to be mistaken.

Upon the whole, then, it appears to me, that a Contingent as well as an Invariable Instinct is clearly manifest ; and that it cannot be denied without ascribing a proper intelligence in cases which are incompatible with its existence.

The summary of the view I have attempted to give of the Brute Nature is this :—That the Brute Mind is constituted by the union of a faculty receptive of influent desires, and a faculty receptive of corresponding Perceptions ; and that Brutes are the subjects of the operation of essential Will and Intelligence, which controul their Natures in various modes ;—and which are manifested in analogous forms of Instinct, as observed in the actions of the Brute Kingdom :—That Brutes are influenced by intermediate agencies between Nature and the Creator, whose Wisdom permits that the evil as well as the good principles of Will and

* Anim. Biog. vol. ii. p. 486.

† Kirby and Spence, vol. ii. p. 519.

Intelligence operative in the mind of Man should be represented around him in the world he inhabits; *—That from the varied influence of these principles the different subjects of the Brute Creation derive each their peculiar disposition and character.

In this manner it appears to me that the World of Mind is in action upon, and in connection with, the World of Nature :—the whole being under the controul of the Supreme Being ; whose Wisdom is displayed in the permission of lesser disorders and

* Mr. W. S. Mac Leay, while examining the theory in which the brain of the inferior animals, or the ganglions which obtain that name, is supposed to be acted upon by the volition of the Deity, and which theory has already been noticed, (p. 350) observes, that it can only have one foundation, “ which is far from being weak or easily subverted,” and which he states as follows: “ It is that this planet and its contents were created for the sole use and instruction of man, who is thus the end of the terrestrial creation. *Principio ipse mundus Deorum hominumque causâ factus est: quæque in eo sunt omnia, ea parata ad fructum hominum et inventi sunt.*” And after controverting that theory by the argument already examined, he continues, “ To me such an argument appears insurmountable ; but I confess its force is very much weakened by the reflection, that the basis of the opposed doctrine is, that every thing we see is intended for our instruction, either with respect to the Divine nature or the human. Now it is manifestly possible to place to this account, not only the apparent consequences of injuries in animals, but all the phænomena they may present.”

The Rev. W. Kirby, in his excellent Address, explanatory of the views of the Zoological Club, delivered at its foundation in November last, when adverting to the propriety of gentlemen’ endeavouring to elucidate natural groups whilst engaged in naming and describing the non-descript animals which their cabinets contain, alludes to the necessity of their keeping in mind the distinction pointed out by Mr. Mac Leay, between affinity and analogy ; and after referring to the numberless instances in which the Naturalist will see the “ simulation of affinity where the reality of it does not exist,” also alludes to the subject of this note, by remarking, “ From this part of the plan of the Creator we may gather, I think, that every thing has its *meaning* as well as its *use*.”

I am much gratified to find in these views, of two such eminent Naturalists, a strong corroboration of the sentiment contained in the above proposition, and expressed in the commencement of my preliminary Essay, that the various objects of Creation are of a symbolic nature ; in which sentiment that which regards Man as the end of the Creation is also implied. Every additional step which is gained by Science, whilst exploring the “ mystic labyrinths” of nature, elicits, I conceive, fresh evidence to this effect.

evils, in order that greater ones may be avoided; and who balances the various powers of all the orders of existence, and their mutual operation, in such a manner as to produce the greatest good.

ART. XLV. *Monograph on the Cypræidæ, a Family of Testaceous Mollusca.* By JOHN EDWARD GRAY, Esq M.G.S.

[Continued from page 152.]

27. *Cypræa Tigris.*

Testâ ovali-ovatâ, ventricosâ, posticè sub-umbilicatâ rotundatâ, albido-cærulescente, guttis nigris, majusculis, numerosis, sparsis; lineâ dorsali ferrugineâ; basi albâ, convexiusculâ; lateribus albidis nigro-guttatis.

Cypræa Tigris, *Lin. Sys. Nat.* 1176. *Martini* i. 330. *Born. Mus.* 182. *Schroeter. Einl.* i. 111. *Gmelin* 3408. *Schreiber's Conch.* i. 64. *Lamarck, Ann. Mus.* xv. 452. *Hist.* vii. 382. *Dillwyn R. S.* 449.

Cypræa Pardalis, *Shaw Nat. Misc.* vi. t. 193.

Icon. Bonanni Rec. Kirch. iii. f. 231, 232. *Lister Conch.* t. 682, f. 29! *Rumph.* t. 38. f. A. *Pet. Amb. Gaz.* t. 96, f. 7! *Gaultier*, t. 14, f. G. *I. L.* t. 16, f. S. *Seba*, iii. t. 76. f. 7, 9, 14. *Knorr.* vi. t. 21. f. 4. *Favanne* t. 30, f. L. 2. *Martini* i. t. 24, f. 232—234! *Born. Mus.* t. 8, f. 7. *Encyc. Meth.* t. 353, f. 3!

β. *flammea*. Testâ luteâ, strigata.

Cypræa flammea, *Gmelin* 3408.

Cypræa, n. 32. *Schroet. Einl.* i. 148.

Valentyn. Abhandlung, t. 4, f. 30.

γ. *nigrescens*. Testâ nigrescente, obscure nigro maculatâ. *Mus. Dom. Edwards.*

2. *Junior*. Testâ ovatâ albidâ, maculatâ.

Cypræa fæmina. *Martini* i. 333. *Gmelin* 3409. *Schreiber's Conch.* i. 65.

Cypræa tigrina. *Gmelin* 3404.

Cypræa seriata. *Solander's Mss. Portland Cat.* 133. lot 2965.

Cypræa, n. 87. *Schroet. Einl.* i. 155.

..... n. 10..... i. 136.

Icon. *Lister Conch.* t. 748, f. 42! 672, f. 18! *Seba* iii. t. 76, f. 8, 12. *Knorr.* v. t. 8, f. 2, 3. *Favanne* t. 30, f. L. 3, 4.

Inhabits Indian ocean, Red Sea, *Bonanni*. Madagascar, *Lister*. Amboyna, *Rumphius*. Java, *Linnaeus*. Isle of France and Molucca, *Lamarck*. Mus. Brit. Sowerby. Nost.

Shell ovate, ventricose, rounded behind, bluish white, ornamented with numerous rather large black spots; dorsal line ferruginous; sides white, spotted with black, thickened, the outer one slightly angular above; base white, concave near the aperture, slightly grooved near the centre of the inner lip; aperture scarcely dilated in front; teeth large, distinct;—outer larger; back of columella smooth, front rather concave, plaited; spire hid, and slightly concave over it; inside white; axis 4, diameter $2\frac{1}{2}$ inches.

This shell is very common, and varies exceedingly in colour and size; but it may always be distinguished from the next by the hinder part being rounded, the spots larger, and the inner lip smother.

28. *Cypræa Pantherina*.

Testâ oblongo-ovatâ, ventricosâ, posticè sub-umbilicatâ, productâ, albido-carneâ, arenaceâ, guttis atro-rubentibus, parvulis, numerosis, ornatâ; lineâ dorsali flavescente; basi albâ, planulatâ; lateribus carneis rufo nigroque maculatis.

Cypræa Pantherina. *Solander's Mss. Portland Cat.* 156. lot 3407. *Dillwyn R. S.* 450.

Cypræa guttata. *Lamarck. Ann. Mus.* xv. 453!

Cypræ tigrinâ. *Lamarck. Hist.* vii. 385!

Icon. *Bonanni Rec* iii. f. 256. *Kirch* iii. f. 255. *Lister Conch.* t. 681, f. 281! *Gaultier*, t. 14, f. H. *Argenville*, t. 18. f. F. *Knorr*, i. t. 26, f. 4. *Martini*, i. t. 24, f. 235, 236! *Favanne*, t. 30, f. L. 6. *Encyc. Method*, t. 353, f. 5!

β. Testâ castaneo-rubrà, obscurè maculatâ.

Inhabits Mediterranean, *Lister*. Adriatic, *Martini*. China

and Arabia Felix, *Humphreys*. *Mus. Brit.* J. Sowerby. Nost. β . *Mus. Brit.*

Shell oblong ovate, ventricose, behind produced, whitish flesh colour, mottled, sandy, ornamented with numerous small reddish black spots; the dorsal line yellowish; sides whitish flesh colour, spotted with red and black, thickened, the outer one rounded, the inner obtusely angular; base white, flattish; aperture rather dilated in front; teeth of the upper lip narrow, close, slightly extended on the inner lip nearly the whole length; of the outer large, distinct; columella plaited, concave in front.

30. *Cypræa sub-rostrata*.

Testâ ovali-ovatâ, ventricosâ, albâ, spirâ convexâ, basi convexiusculâ; extremitatibus sub-productis, marginatis; lateribus subincrassatis rotundatis; columellâ lævi, planâ profundâ.

Nehoue. *Mus. Sowerby*.

Shell oval ovate, nearly globular, spire convex, distinct; base convex; sides rather thickened, obtusely margined; extremities rather produced, distinctly margined; aperture rather large, front concave; columella smooth, front flat, smooth, deep; axis $\frac{10}{10}$, diameter $\frac{7}{10}$ of an inch, sometimes larger.

**** CYPRÆÆ VERÆ.**—Shell, when young, smooth, banded; when perfect, polished, smooth, edge entire. Inner lip, close to the columella, leaving no, or scarcely any, concave space; the plaits carried over the columella.

Obs. In almost all the species of this section, there is no depression on the columella, but the plaits run over it without any interruption; and in those few species that do possess any depression, it is very different in form from the similar part in the former section, to which they cannot be referred, as it would require that some very approximating species, as *C. caurica*, and *C. variorularia*, &c. should be separated from one another. Some of the species, as, *C. Asellus*, *C. interrupta*, *C. quadrimaculata*, *C. Hirundo*, *C. stolidus*, and *C. Moneta*, are tubercular, or ribbed at the base; but they have no depression on the columella, and consequently cannot be confounded with the last section, to which they have considerable affinity.

31. *Cypræa Onyx*.—The Onyx Cowry.

Testâ ovato-pyriformi, subumbilicatâ, obscurè fasciatâ, albido-violaceâ; lateribus subtusque nigris; lineâ dorsali latâ, pallidâ; dentibus fusco-nigris; columellâ anticè plicatâ.

Cypræa onyx. *Lin. Sys. Nat.* 1177. (1). *Gmelin*. 3410. *Dillwyn* 453.

Cypræa pulla. *Gmelin* 3412. (2). *Schreib. Conch.* j. 69.

Cypræa adusta. *Chemnitz* x. 106. *Lamarck Ann. Mus.* xvi. 92. *Hist.* vii. 389.

Cypræa n. 20. *Schroet. Einl.* t. 139.

Icon. *Bonanni Rec.* iii. f. 255, (j). *Kirch.* iii. f. 254. *List. Conch.* t. 657. f. 2! *Gaultier* t. 15. f. N. (1). *Chemnitz* x. t. 145. f. 1341!

2. *Incompleta*. Testâ ovatâ, umbilicatâ, fusco-rufescente, zonis binis pallidis; basi lateribusque pallidè brunneis; dentibus aurantiis.

3. *Decorticata*. Testâ dorso pallide bifasciato.

Icon. *Martini* j. t. 20. f. 269, 270.

Cypræa pulla. *Gmelin* 3412. *Schreiber's Conch.* j. 69.

Inhabits Coast of Asia. *Linnæus*. *Lamarck*. *Mus. Brit.* J. Sowerby, Nost.

Shell ovate, rather ventricose, with two very obscure, narrow, pale brown bands; back, pale lilac, with a broad dorsal line, exhibiting the fuscous undercoat; the base and sides brownish black; the base rather convex; the sides slightly thickened, upper part paler; teeth, blunt, rather distant, black, all small except the two or three front, which are large and extended over the columella; spire, concave, often closed over when full grown.

When young, the shell is dark reddish-brown, with two narrow pale bands; the base is pale fulvous, with orange teeth. When it becomes more perfect, the edge is more thickened and blacker, and there is a narrow dorsal line, and the teeth are still orange; at length the pale lilac coat is thrown over, leaving a broad lanceolate dorsal spot, and the base and teeth become quite black. It varies greatly in size: n. 1, axis $\frac{1\frac{2}{10}}$, diameter $\frac{7}{10}$, and n. 2, axis $\frac{1\frac{9}{10}}$, diameter $\frac{1\frac{2}{10}}$ of an inch.

The shape of the columella, and the color of the teeth, at once distinguishes this species from the next.

32. *Cypræa Pyrum*.—The Pear Cowry.

Testâ ovatâ, pyriformi, subumbilicatâ, fulvo rufescente; dorso subfasciato, et maculis albidis nebulato; lateribus subtusque fulvo-croceis; dentibus albidis; columellâ anticè lævi.

Cypræa Pyrum. *Gmelin* 3411. (1). *Schreiber's Conch.* j. 69. *Dillwyn.* ii. 457.

Cypræa flaveola. *Born. Mus.* 190.

Cypræa maculosa. *Gmelin* 3412 (2).

Cypræa ochracea. *Solander's MSS. Portland Catal.*

Cypræa Siciliana. *Ulysses' Travels* 455.

Cypræa Rufa. *Lamarck Ann. Mus.* xvi. 92. *Hist.* vii. 388.

"*Cypræa cinnamomea.* *Oliv.*" *Dillwyn.*

"*Cypræa variolosa.* *Gmelin.*" *Dillwyn.*

"*Cypræa fulva.* *Gmelin.*" *Dillwyn.*

Cypræa n. 16. *Schroeter Einl.* j. 188.

Icon. Bonanni Rec. iii. f. 259. (2). *Kirch* iii. f. 258. (2).

Gaultier t. 14. f. E. (1). *Martini* j. t. 26. f. 267, 268 (1)!

Encyc. Method. t. 353. f. 1.!

Inhabits Mediterranean and African Sea, Sicily, *Bonanni.* Africa and Malaga, *Martini.* Adriatic Sea, *Brochi.* Senegal and Gulf of Tarent, *Lamarck.* *Mus. Brit. Nost.*

β. fossilis. *Lamarck. Ann. Mus.* xv. *Hist.* vii. 406.

"*Plaisantin.* *Mus. Dom. Faugas.*" *Lamarck* l. c.

Shell ovate pear-shaped, mottled with brownish fulvous, spotted with white and darker brown, obscurely banded; base rather convex, bright reddish fulvous; sides rather thickened, the same colour as the base; aperture fulvous; teeth blunt, rather distant, white; columella smooth, and rather concave in front, with the innermost part rather denticulated; spire concave, often covered; inside white. Axis $\frac{1\frac{1}{2}}{10}$, diameter $\frac{9}{10}$ of an inch.

Certainly the most beautiful of the European species.

33. *Cypræa pyriformis*.—The Pear-shaped Cowry.

Testâ ovatâ, pyriformi, subumbilicatâ, albido-cinereâ, obscurè trifasciatâ; lateribus subtusque albis; marginibus sub-

crassatis fusco-punctatis; dentibus columellâ fuscis; columellâ anticè plicatâ.

Icon. *Zool. Journal*, t. . f. .

Inhabits. ————— Mus. Nost.

Shell ovate, pear-shaped, pale blueish-grey, with three obscure bands; the base convex, white; margin slightly thickened and rounded on the sides, and sharp towards the anterior of the extremity, white, with small scattered purplish-brown spots, and one larger one over the spire. Spire concave, partly covered. Aperture rather narrow, white. Teeth, of the inner lip, narrow, long, rather distant; those of the upper part brown; those of the anterior, thicker, paler. The columella flat, plaited the whole length. Outer lip narrow, shelving outward, except at the anterior part, where it is margined and shelving towards the mouth, with teeth rather large, and distant; inside greyish-white. Axis $\frac{12}{10}$; diameter $\frac{7}{10}$ of an inch.

I possess only two specimens of this shell; one of which is not quite formed, and is of a pale whitish colour, with a distinct broad fulvous central band; and the other is fully formed, but unfortunately has the back completely decorticated: in this state it is grey, with the obscure blueish bands and the central fulvous one. I am therefore unable to give the true colour of the back, which I leave to be filled up at a future time. I have not the slightest doubt of its being a distinct species, from its form, which approaches most nearly to that of *C. pyrum*, and from the colour of its teeth.

34. *Cypræa undata*.—The Waved Cowry:

Testâ oblongo-ovatâ, umbilicatâ, albidâ, zonis tribus interruptis et lineis fulvis flexuosis undatim pictâ; basi lateribusque albis, punctis fuscis notatis.

Cypræa undata. *Solander's MSS. Lamarck. Hist.* vii. 394.

Cypræa zigzag. *Lamarck. Ann. Mus.* xvi. 96.

Icon. *Argenville Conch.* t. 18. f. N. ! *Favanne* t. 29. f. 00. *Martini j.* t. 23. f. 266, 267 ! *Encyc. Method.* t. 356. f. 1 !

2. *decorticata*. Testâ castaneâ; basi albidâ, fusco maculatâ.

Inhabits Atlantic Ocean. Lisbon, *Lamarck*. Mus. Brit. J. Sowerby, Nost.

Shell oblong ovate, white, ornamented with three or four interrupted chesnut-brown bands, with irregular edges, which give out many thin zigzag lines, bent towards the outer lip; base white, spotted with brown, rather convex, slightly margined on the edge of the outer side, with generally a dark spot on the upper part of each extremity of the mouth; aperture scarcely dilated in front; teeth of the inner lip small, except in front, where there are three large; those of the outer lip distinct and blunt: columella smooth; spire concave, or umbilicated, rarely covered over; inside brownish-white; axis $\frac{12}{10}$, diameter $\frac{7}{10}$ of an inch.

35. *Cypræa ziczag*.—The Zigzag Cowry.

Testâ oblongo-ovatâ, umbilicatâ, cinereo-albidâ, pallidè, subfasciatâ, lineis flavescentibus transversim undulatis pictâ; extremitatibus fusco-punctato-fasciatis; basi lateribusque luteis, fusco-punctatis.

Cypræa ziczag. *Lin. Sys. Nat.* 1177. *Schroeter Ein.* j. 116. *Gmelin* 3410. *Schrieber's Conch.* j. 67. *Lamarck. Hist.* vii. 394. *Dillwyn, R. S.* 454.

Cypræa undata. *Lamarck Ann. Mus.* xvi.

Icon. *List. Conch.* t. 66. f. 5! *Petiver's Gaz.* t. 12, f. 7. *Argenville* t. 18. f. R. *Martini* t. 23. f. 224, 225. *Encyc. Method.* t. 356. f. 8. a. b.!

2. *Incompleta*? Testâ luteo-fusco maculis albidis sagittatis fasciatâ.

Inhabits East Indian Seas. *Humphreys*. Mus. Brit. J. Sowerby, Nost. 2. Mus. Mawe.

Shell oblong-ovate, greyish-white, ornamented with three obscure yellowish bands, sometimes very much interrupted, the space between the bands marked with wavy yellowish lines of various breadths; close to each end of the last whorl there is a row of small brown spots; the base yellowish, spotted with brown, rather convex; the edge slightly thickened and margined, especially on the outer side, and often ornamented with two small brown spots on the upper part of each extremity of the mouth; aperture nar-

row, teeth blunt; columella smoothish; spire concave, sometimes nearly closed over; inside brownish: axis $\frac{7}{10}$, diameter $\frac{4}{10}$ of an inch.

I have seen a shell, which was said to be the young of this species, of a yellowish-brown colour, ornamented with several bands formed of white arrow-shaped or heart-shaped spots. It is probable that this may hereafter prove to be a distinct species.

This species is somewhat similar to the preceding, but it may be instantly distinguished from it by its smaller size, lighter colour, and its ornamental rows of small brown spots, one of which is near the suture, and the other at the front extremity of the last whorle. Lamarck has corrected, in his excellent history, the confusion which he had previously created between this and the preceding.

36. *Cypræa clandestina*.—The clandestine Cowry.

Testâ oblongo-ovatâ, umbilicatâ, albâ, zonis tribus incarnatis obsoletis, lineisque longitudinalibus subtilissimis, flavescentibus, passim concurrentibus; basi lateribusque albis.

Cypræa clandestina. *Lin. Sys. Nat.* 1177! *Gmelin* 3410. *Dillwyn, R. S.* 453!

Cypræa moniliaris. *Lamarck Ann. Mus.* xvi. 98! *Hist.* vii. 396.

"*Cypræa nitida*. *Solander's MSS.*" *Humphreys*.

Cypræa Asellus. var. C. *Dillwyn, R. S.* 456.

Icon. *Petiver Gaz.* t. 97. f. 10.!

2. *decorticata*. Testâ albâ, dorso luteo, fusco trifasciato.

Inhabits Asiatic Ocean. *Lamarck*. Ceylon, *Solander*. *Mus. Brit. J. Sowerby, Nost.*

Shell oblong-ovate, white, with three obscure broad flesh-coloured bands, and marked with very narrow yellow longitudinal lines, which are often concurrent; the base is white, rather convex; the edge is thickened and slightly margined, especially on the outer side and front extremities; the teeth are white, rather distant, and slightly produced over the lips; the columella front very slightly concave, plaited; spire concave, partly covered up; inside white: axis $\frac{8}{10}$, diameter $\frac{6}{10}$ of an inch.

This shell appears to have been involved in obscurity since the

time that Linnæus first described it from the note of Mr. J. Zolga. Dr. Solander, according to Mr. Dillwyn, supposed it to be a variety of *Cypræa ziczag*, figured by Martini, which is *C. undata* of Lamarck, and which has a spotted base. It was described by Lamarck as a new species, under the name of *C. moniliaris*, without his taking any notice of the yellow lines; but he refers to the excellent figure of Petiver, in which they are very evident. Dillwyn placed this species as a variety of *C. Asellus*, to which both Linnaeus and Lamarck had compared it, but from which it has several very peculiar differences both in colouring and form of teeth.

37. *Cypræa Asellus*.—The Wood-Louse Cowry.

Testâ oblongo-ovatâ, albâ, dorso fasciis tribus fusco-nigris ornâtâ; basi inæqualiter subcostatâ.

Cypræa Asellus. *Lin. Sys. Nat.* 1178. *Born. Mus.* 185. *Schroeter Einl.* j. 117. *Gmelin* 3411. *Schreiber's Conch.* 68. *Lamarck Ann. Mus.* xvi. 98. *Hist.* 396. *Dillwyn R. S.* 456.

Icon. *Bonanni* t. 39 f. M. *Lister Conch.* t. 666, f. 10! *Rumphius* t. 39, f. M. *Petiver Gaz.* t. 97. f. 11. *Amb.* t. 16, f. 18. *Gaultier* t. 15. f. M. *Argenville* t. 18, f. F. *Adanson, Senegal.* t. 5. f. II. *Knorr.* iv. t. 23, f. 3. *Favanne* t. 29. f. P. *Martini* j. t. 27, f. 280. *Born. Vig.* 171. f. D. *Encyc. Method.* t. 58. f. 5.!

β. flavescens. Fasciis lutescentibus.

Gaultier t. 15. f. CC and DD. *Martini* j. t. 27. f. 281.

2. *Decorticata.* Testâ pallide roseâ, obscure albido-fasciatâ.

Inhabits Asiatic and African Ocean; Maldives, *Lister*. Amboyna, *Rumphius*. Senegal, *Lister*. China, *Humphries*. *Mus. Brit.* J. Sowerby, Nost.

Shell oblong-ovate, white, the back ornamented with three brownish or yellowish black bands; spire flat, covered; base white, rather cylindrical; edge rather thickened, and slightly margined on the outer side and extremities; teeth smallish, partly extended over the base, especially at the hinder part of the inner lip, where they are slightly tubercular; columella, front flat, plaited; inside purplish-white, axis $\frac{7}{16}$, diameter $\frac{4}{16}$ of an inch.

This species varies considerably in size, and in the bands being darker and paler, and in their sometimes being edged with yellow.

38. *Cypræa interrupta*.—The Broken-banded Cowry.

Testâ oblongo-ovatâ, subumbilicatâ, albido-cærulescente, interruptè trifasciatâ, punctisque fulvis nebulatâ; basi lateribusque albis; subtus convexâ, æqualiter subsulcatâ.

2. *decorticata*. Testâ albido-violaceâ, interruptè trifasciatâ; fasciis antice bifidis.

Inhabits. ———. Mus. Brit. J. Sowerby, Nost.

Shell oblong-ovate, blueish-white, clouded with minute yellowish dots, and with three broken brownish bands, the two foremost of which are generally divided spirally into two, and the hinder one mostly single and formed of oblong transverse spots; the spire is slightly concave, covered; the base and sides white; the edge slightly thickened all round, rounded on the sides, and slightly produced at the posterior extremity; the anterior extremity ornamented with a brown lunate spot on its upper part; teeth smallish, even, slightly extended over the lips, so as to make the base evenly grooved.

This shell agrees in some measure with the description of *Cypræa tabescens* of Solander's MSS. (*Martini* j. t. 28. f. 294, 295.); but the teeth are small and closer, and the bands are differently placed, as the hind one is only a little distance from the spire. I therefore consider it a distinct species, which is always to be known by its evenly sulcated base and articulated bands.

39. *Cypræa quadrimaculata*.—The Four-spot Cowry.

Testâ oblongo-ovatâ, albido-cærulescente; dorso punctis minutis, fulvis, nebulato; basi marginibusque albidis; extremitatibus nigro bimaculatis; subtus planulatâ inæqualiter semisulcatâ.

Icon. Zool. Journ. t.

Inhabits. ——— Mus. Nost.

Shell oblong-ovate, blueish-white, with the back speckled with minute fulvous dots; the spire flat; the base and margin white; the edge slightly thickened, rounded at the sides; the extremities rather produced, with two blackish-brown spots on the upper part of each; the base flattish; aperture rather narrow; teeth

rather large, extended like ridges partly over both the lips; the hinder ribs, especially of the inner lip, large and rather prominent; columella plaited, front plaits largest; inside violet: axis $\frac{8}{10}$, diameter $\frac{4}{10}$ of an inch.

This very distinct species bears much resemblance, at first sight, to the last; but it has not any appearance of bands, and the teeth and furrows of the base are very different and more like those of *C. Asellus*. It is instantly distinguished from all the other Cyprææ by the two black spots at each extremity. I have only seen one specimen of it, which is in my collection; nor have any of my friends recollected seeing it in any other cabinet; I am therefore inclined to consider it as rare.

40. *Cypræa Hirundo*.—The Swallow Cowry.

Testâ oblongo-ovatâ, albido-cærulescente, fasciis inæqualibus tribus fusco-nigris ornatâ, fulvo fusco inæqualiter punctatâ; basi marginibusque albis, fusco-punctatis; extremitatibus fusco-nigro bimaculatis; subtus planulatâ, æqualiter semi-sulcatâ.

Cypræa Hirundo. *Lin. Sys. Nat.* 1178. (1). *Born. Mus.* 184. *Schroet. Einl.* j. 116. *Gmelin* 3411. *Schreiber's Conch.* j. 116. *Lamarck Ann. Mus.* xvi. 95. *Hist.* vii. 393. *Dillwyn R. S.* 455.

Icon. *Lister Conch.* t. 674. f. 20! *Pet. Gaz.* t. 30. f. 3! (1). *Knorr.* iv. t. 25. f. 4. *Martini,* j. t. 28. f. 282. *Born. Mus.* t. 8. f. 11! “*Encyc. Method.* t. 356. f. 6. f. 15.” *Lamarck.*

β. formosa. Testâ obscurè fasciatâ, fulvo subpunctatâ, maculâ dorsali rufescente latâ signatâ; extremitatibus fusco-maculatis.

Cypræa Hirundo, Var. C. *Lamarck.* l. c.

2. *decorticata.* Testâ albidâ, zonis tribus rufis inequalibus; extremitatibus bimaculatis.

Cypræa Ursellus. *Gmelin* 3411. *Schreiber's Conch.* j. 60. *Lamarck. Ann. Mus.* xvi. 98. *Hist.* vii. 395. *Dillwyn, R. S.* 455.

Icon. *Rumphius* t. 39. f. O. *Gaultier* t. 15. f. L. *Martini* j. t. 24 f. 241. bad. “*Encyc. Method.* t. 356. f. 6.”? *Lamarck.*

Inhabits Indian Ocean. The Maldives, *Lister.* Antilles, *Muller.* *Mus. Brit. J. Sowerby*, Nost. *β. Mus. Dom. Mawe.*

Shell oblong-ovate, bluish white, with three irregular bluish-black bands, and ornamented with minute fulvous brown scat-

tered dots, and sometimes blotches of the same colour; the spire flat; the base and sides white dotted; the edge slightly thickened, rounded on the sides; the extremities slightly produced and margined on each side, and ornamented with two black-brown spots at the upper part of each end; teeth even, rather large, extending halfway over the lips on each side, into equal rib-like striæ; columella flat, or slightly concave in front, plaited; inside brownish-purple: axis $\frac{7}{16}$, diameter $\frac{4}{16}$ of an inch.

This shell varies considerably in its colouring; being sometimes plain blueish-white with a few small brown dots, and at others, as in the variety β ., having one or two large fulvous brown irregular blotches, the bands scarcely visible. This latter variety approaches very much in appearance to *C. stolidæ*; but it is instantly to be distinguished from it by the teeth being white. It may indeed prove a distinct species when more of them are found, but I have thought it best to keep it only as a variety, as I have only seen one specimen, which is in Mrs. Mawe's private cabinet. When the outer coat is worn off, the bands are at first black, but become reddish when the back is still more worn. This species sometimes loses the spots at one or both extremities, when it is the *C. Ursellus* of Gmelin. Lamarck arranges *C. felina* as a variety of this species; this however is perfectly distinct. There exists a considerable difficulty respecting the reference to the figure of the French Encyclopædia, and I have for this account only copied the references of Lamarck.

41. *Cypræa stolidæ*.—The Foolish Cowry.

Testâ oblongo-ovatâ, albidâ-cærulescente, maculâ dorsali quadratâ fulvâ albo punctatâ, angulis decurrentibus ornatâ; extremitatibus productis, fulvo-fusco bimaculatis; basi convexâ, albidâ, fulvo punctatâ, æqualiter semisulcata; dentibus fuscis.

Cypræa stolidæ. *Lin. Syst. Nat.* 1183 (11)! *Born. Mus.* 19. *Chemnitz* xi. 41. *Lamarck Ann. Mus.* xvi. 95. *Hist.* 392. *Dillwyn. R. S.* 462.

Cypræa rubiginosa. *Gmelin* 1721.

"*Cypræa arabica*, Var. *Schreiber's Conch.* j. 54." *Dillwyn.*

Cypræa, n. 32. *Schroeter Einl.* j. 142.

Icon. *Petiver Gaz.* t. 97, f. 18. (1)! *Argenville* t. 18, f. Y.
(!) *Martini j.* t. 29, f. 305! *Favanne*, t. 29, f. 3. *Born. Mus.*
t. 8. f. 15! *Chemnitz xi.* t. 180. f. 1743, 1744!

Inhabits, East Indian Seas; Eastern Ocean. *Chemnitz. Mus.*
J. Sowerby Nost.

Shell oblong ovate, greyish-white, with a square, irregularly edged, perforated fulvous spot on the centre of the back, which gives off at each angle an irregular long transverse band towards the ends; spire slightly concave, covered; base whitish, spotted with small fulvous spots, rather convex, edge thickened; outer lip and extremities slightly margined; extremities produced, with two pale fulvous spots on the upper part of each end; teeth large, blunt, extending half way over each of the lips, into nearly equal rib-like striæ, which are white, with a brown line on each side of their centres; columella slightly plaited and concave the whole length, innermost part denticulated; inside pale violet. Axis $\frac{8}{10}$, diameter $\frac{7}{10}$ of an inch.

This is a very beautiful species, which has generally been regarded as rare. Considerable confusion has existed in respect to it among authors, by whom it has been usually considered to refer to imperfect specimens of *C. caurica*; which have therefore been frequently taken for *C. stolidæ* of Linnæus.

42. *Cypræa pulchella*.—The Pretty Cowry.

Testâ ovatâ, albidâ, obscurè fasciatâ, fulvo punctatâ maculis dorsalibus duobus fulvis irregularibus signatâ; lateribus albido-flavescentibus, nigro-fusco guttatis; basi convexâ, striata, striis elevatis spadiciis.

Cypræa pulchella. *Swainson Phil. Mag.* lxi. 376.

Icon. *Exotic Conch.* t.

Inhabits China. *Mus. Dom. Mawe.*

Shell ovate or sub-oblong-ovate, white, with three very obscure broad purplish bands; the back irregularly clouded with minute yellowish fulvous dots, and ornamented with two irregular square-ish fuscous dorsal spots, sides yellowish-white, with a few large-ish round, blackish-brown spots, and dark brown at the ends; the spire concave, covered; the base convex, the teeth narrow, small,

distinct, brown, extending like ribs nearly to the margin of the outer halfway over the inner lip: front part of the columella rather concave, plaited. Axis $\frac{1}{10}$, diameter $\frac{5}{10}$.

This very beautiful *Cypræa* I have only observed in the possession of Mrs. Mawe, to whose liberality I am indebted for permission to take the above description.

Mr. Swainson having described this species a few months before the publication of the species which I have called *C. pulchella*, it is necessary that the name of the latter species should be changed. I propose therefore, to call it in future *Cypræa Pulchra*, the *Beautiful Cowry*.

43. *Cypræa punctata*.—The Dotted Cowry.

Testâ oblongo-ovatâ, umbilicatâ, albido-carneâ, maculis inæqualibus fulvo-fuscis sparsis; basi albidâ, fusco-lineatâ, semi-sulcatâ.

Cypræa punctata. *Lin. Mantiss* 548. *Gmelin* 3414. *Solander's Mss.* *Dillwyn R. S.* 458.

Cypræa antomaria. *Gmelin.* 3412. *Schreiber's Conch.* 59.

Cypræa n. 25. *Schroeter Einl.* j. 140.

Cypræa Stercus Muscarum. *Lamarck An. Mus.* xvi. 98. *Hist.* 396.

Icon. *Martini.* j. t. 28. f. 290, 291! *Encyc. Method.* t. 355, f. 10.

β. *Decolorata*. Basi dentibusque albis.

γ. *Maculata*. Extremitatibus nigris fuscis maculatis.

Inhabits. ——— Mus. Brit.

Shell oblong ovate, white, with a tinge of flesh colour, sprinkled with irregular roundish bright fulvous brown spots, which are smaller towards the sides; spire concave, covered, white with a brown spot at the base; the base scarcely thickened, whitish lined with brown; aperture narrow; teeth minute, extended rib-like over the base, nearly to the margin, edged with brown; columella front rather concave, plaited, outer lip slightly shelving inwards in front. Axis $\frac{6}{10}$, diameter $\frac{3}{10}$ of an inch.

The teeth and base are sometimes white; and also the hinder extremity just over the spire is sometimes convex, with two large spots,



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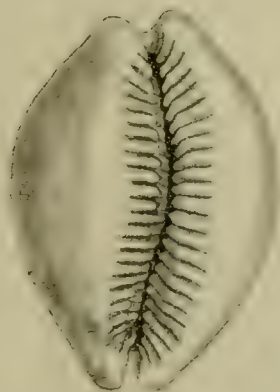
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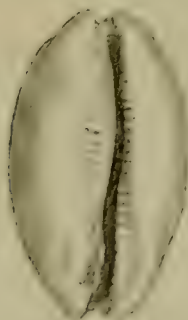
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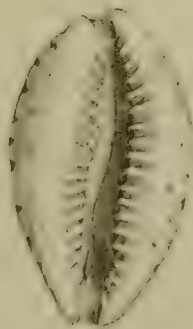
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44. *Cypræa tabescens*.—The Rotten Cowry.

Testâ oblongo-ellipticâ, subcylindricâ, subumbilicatâ, albido-cærulescente, interruptè fusco trifasciatâ, punctisque fulvis nebulatâ; basi albâ; labro marginato, suprâ fusco maculato; dentibus approximatis; columellâ concavâ.

“*Cypræa tabescens*. *Solander's Mss.*” *Dillwyn R. S.* 463. (1)

Cypræa stolidâ. *β. Gmelin*, 3417. (1.)

Cypræa n. 26. *Schroeter Einl.* j. 141.

Cypræa teres. *Gmelin* 3405. (2.) *Schreiber's Conch.* 116.

Dillwyn R. S. 445.

Cypræa, n. 110. *Schroeter Einl.* j. 161. (2.)

Icon. Bonanni Rec. 217. *Mus. Kirch.* j. ii. 237. *Martini j. t.* f. 294. 295. ! (1.) *Schroeter Einl.* j. t. 1. f. 7. (2.) *Rumphius t.* 39. f. F? *Pet. Anib. t.* 16. f. 13?

Inhabits. ——— *Mus. Nost.*

Shell oblong elliptical, nearly cylindrical, blueish-white, with three broken fulvous brown bands, of which the anterior is simple, the central one double, each formed of small square spots, and the hinder one formed of oblong oblique spots, and clouded with fulvous brown specks; spire small, slightly concave, covered; the base sub-cylindrical, white; the edge white, with a few brown spots on the upper part; the edge of the outer lip and front extremities margined. Base rounded convex; aperture rather large; teeth of the inner lip small, rather close; columella concave, and plaited the whole length; outer lip sinuous, teeth large, close, slightly extending rib-like over the lip, inside purple. Axis $\frac{1\frac{1}{2}}{10}$, diameter $\frac{5}{10}$ of an inch.

The disposition of the colouring of this species is very like that of *C. interrupta*, but the central band alone is double, and it is of a darker hue than in that species, from which it also differs, in being larger and more cylindrical; in the outer lip being acutely margined, and sinuated. From the next species it differs in the concavity of the columella, and in the teeth of the outer lip being smaller and scarcely extended over it, as well as in the spire, which is smaller and concave, instead of extended and flat.

I had this shell from the collection of Dr. Coombs, under the name of *C. teres*; the description of it agrees with that of *C. ta-*

bescens. It also resembles the figures given by Martini of this species, which appears to be very obscure. I have therefore united them together and adopted the oldest name.

45. *Cypræa cylindrica*.—The cylindrical Cowry.

Testâ oblongo-ellipticâ, sub-cylindricâ, albido cærulescente, (obscurè fusco trifasciatâ, punctisque fulvis nebulatâ;) spirâ planâ; basi sub-cylindricâ, semisulcata, albâ; labro marginato; dentibus maximis; columellâ convexiusculâ.

Cypræa cylindrica. Born. *Mus.* 184. ! Gmelin 3405. Schreiber's *Conch.* j. 77. Dillwyn *R. S.* 452.

Cypræa n. 109. Schroeter *Einl.* j. 160.

β. *Decorticata*. Testâ albido-purpureâ, extremitatibus fusco-rufescente bimaculatis.

Icon. Born. *Mus.* t. 8. f. 10. Sowerb. *Gen.* f.

Inhabits. ——— Mus. Nost.

Shell oblong elliptical, nearly cylindrical, blueish white, (mottled with small yellowish spots, and with three obscure brownish bands;) spire large, flat; base white, nearly cylindrical, flattened and sharply margined on the outer lip and at the extremities, which in worn shells have each two brown spots; aperture rather large; teeth white, those of the inner lip partly extended rib-like over the base, narrow and close, except the three or four anterior ones which are rather large and distant; columella plaited, rather convex; outer lip rather broad; teeth large, distant, extended rib-like not quite to the edge; inside purplish white. Axis $\frac{13}{10}$; diameter $\frac{6}{10}$ of an inch.

The only specimen which I possess of this species, is decorticated, which appears to be the only state in which it has been seen by those naturalists who have described it. I have however, seen a specimen, some time ago, in a perfect state, from the recollection of which I have given in a parenthesis an account of its colour.

46. *Cypræa cribraria*.—The Sieve Cowry.

Testâ oblongo-ovatâ, sub-umbilicatâ, albidâ, latè luteo reticulatâ, maculis albidis rotundis sub-æqualibus confertis pictâ; lineâ dorsali laterali; labro marginato, flavo punctato.

Cypræa cribraria. *Lin. Sys. Nat.* 1176! *Born. Mus.* 186.
Schroet. Einl. j. 119. *Gmelin* 1434. *Schreiber's Conch.* j. 74.
Lamarck Ann. Mus. xvi. 94. *Hist.* vii. 391. *Dillwyn R. S.* 458.
Icon. List. Conch. t. 695. f. 42! *Petiver's Gaz.* t. 8. f. 3.
Argenville t. 18. f. k. *Regenfuss j.* t. 12. f. 74. *Favanne* t. 29,
f. 13. 14. *Martini* 1. t. 31. 336. *Encyc. Method.* 355. f. 5.

Inhabits China. *Humphreys.*

Shell oblong ovate, white, or yellowish-white, covered with a pale fulvous brown coat perforated with numerous large, nearly equal, round holes, which show the white ground colour of the shell, and leave a straight lateral dorsal line; spire small, concave, covered; base rather convex, white; edge sharply margined on the outer side and the extremities; the outer lip mostly ornamented with a few small yellow spots on the upper part; aperture rather large; teeth of the inner lip rather distant, small, narrow, except the two or three anterior ones, which are rather distant; those of the outer lip large, blunt, distant, slightly extended over the shelving outer lip; columella scarcely concave, plaited; inside white. Axis $\frac{11}{10}$, diameter $\frac{6}{10}$ of an inch.

This shell varies greatly in the colour of the outer coat from yellow to reddish-brown; and also in size.

47. *Cypræa fimbriata.*—The fringed Cowry.

Testâ oblongo-ovatâ albido-cærulescente; fasciis quinque obscuris fuscis interruptis ornata; basi albâ planulatâ; labro submarginato, minutè punctato; extremitatibus violaceo bimaculatis.

Cypræa n. 14. *Schroeter. Einl.* j. 237.

Cypræa fimbriata. *Gmelin* 3423? *Schreiber's Conch.* t. 79. *Dillwyn R. S.* 465.

"*Cypræa tenella.* *Solander's Mss.*" *Dillwyn.*

Icon. Martini j. 26. f. 263!

Inhabits. ——— *Mus. Nost.*

Shell oblong ovate, blueish-white, with five obscure, pale, narrow, yellowish interrupted bands, four of which are arranged in pairs; spire flat, covered; base white, rather flat; edge roundly margined on the outer side and extremities, which have each two violet spots; aperture rather wide and concave in front, white,

teeth even, close, small, except the two front ones of the inner lip; columella flat, plaited; inside purplish-white. Axis $\frac{5}{10}$, diameter $\frac{3}{10}$ of an inch.

This Shell is instantly to be known by the purple spots at the extremities. It sometimes varies to twice the size above-mentioned.

48. *Cypræa felina*.—The Cat Cowry.

Testâ oblongâ-ovatâ, albido-cærulescente, obscure fusco trifasciatâ, punctulisque fulvis nebulatâ; basi convexiusculâ, marginibus luteis nigro guttatis.

Cypræa n. 24. *Schroeter Einl.* j. 140.

Cypræa felina. *Gmelin* 3412. ! *Dillwyn R. S.* 450.

Cypræa Asellus var. *Schreiber's Conch.* 68.

"*Cypræa olivacea.* *Solander's Mss.*" *Dillwyn.*

Cypræa hirundo, b. *Lamarck. Ann. Mus.* xvi. 95. *Hist.* vii. 393.

Icon. *Lister Conch.* t. 680. f. 27 ! *Encyc. Method.* t. 356. f. 1.

β. *Gibbosa.* Testâ ovatâ, cæteris priori simili.

γ. *Listeri.* "Testâ oblongo-ellipticâ albido-cærulescente, fasciis quinque obscuris fuscis interruptis ornatâ, punctisque fulvis nebulatâ; basi planâ; marginibus albis nigro guttatis.

Icon. *Martini j.* t. 28. f. 283. 284 !

γ. 2. *Decorticata.* Testâ cærulescente, quinque fasciata.

Icon. *List. Conch.* t. 674. f. 21 !

Inhabits, Indian Ocean and African Seas. Maldives. *Lister Mus. J.* Sowerby, Nost. β. *Mus. Bennett.* γ. *Must Nost.*

Shell oblong ovate, blueish-white, clouded with fulvous brown spots, with three obscure brownish bands, the two anterior of which seem to be divided longitudinally in the middle, so as to appear like five bands; spire flat, covered by the front of the margin; base rather convex, flat, in front yellow; edge thickened, rounded, yellow, with a few large purplish-brown spots, two of which are always at the extremities, and the others appear to be placed at the ends of the bands, with sometimes one or two smaller in the intervening spaces; aperture rather large, whitish; teeth on the inner lip rather small, distant; columella plaited and rather

concave the whole length; teeth of the outer lip rather large, distant, slightly extended over the lip, inside purplish-white. Axis $\frac{10}{100}$, diameter $\frac{6}{100}$ of an inch.

This shell varies its shape, by being sometimes ovate and gibbous at the back.

The third variety may perhaps be a distinct species, as I have seen several of them, which all agree in being longer, and narrower, with the base flat, and white, and in the spots being more distinct. In the teeth, however, and general disposition of the colouring, they agree with this species.

49. *Cypræa erronea*. The Doubtful Cowry.

Testâ ovato-oblongâ, subumbilicatâ, albido-cærulescente, subfasciatâ, punctis viridi-fulvis confertis nebulatâ; lateribus, basi-que flavescentibus; extremitatibus interdum bimaculatis.

α. Testâ ovato-oblongâ, dorsâ maculâ fuscâ notato, basi albidâ, extremitatibus immaculatis.

Cypræa erronea. *Lin. Sys. Nat.* 1178. *Born. Mus.* 185. *Gmelin* 3411. "*Solander's Mss.*" *Dillwyn, R. S.* 456.

Cypræa erronea. *Turt. Sys. Nat.* iv. 340.

Cypræa virescens. *Humphreys Calonne's catalogue.*

Cypræa ferruginosa. *Dr. Combes' Mss.*

Cypræa olivacea, var. b. *Lamarck, Hist.* vii. 392.

Icon. *Pet. Gaz.* t. 97. f. 21.

β. *Ovata*. Testâ ovatâ, dorso nebulatâ, basi lateribusque flavis, extremitatibus immaculatis.

Cypræa Ovum. *Gmelin*, 3412. (1) *Schreiber's Conch.* 69.

Cypræa olivacea. *Lamarck Ann. Mus.* xvi. 95. *Hist.* vii. 392.

Cypræa spurca. *Born.* 190. (2)

Cypræa oblonga. *Gmelin.* (2)

Icon. *Martini.* j. t. 27. f. 278, 279. (1) *Born. Mus.* t. 8. f. 14. (2.)

γ. *Bimaculata*. Testâ ovato-oblongâ, dorso nebulato, basi lateribusque flavis, extremitate anteriori nigro bimaculatâ.

Icon. —————

2. *Decorticata*. Testâ purpureâ, basi albidâ planulatâ.

Inhabits Indian Ocean. *Humphreys.* α. β. γ. *Mus. Nost.*

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Shell ovate oblong, blueish-grey, with three obscure bands, and closely speckled with greenish fulvous dots; middle of the back marked with a large irregular, squarish, brownish spot; spire slightly concave, partly covered; base flattish, yellowish-white; edge rounded, except at the front extremity, which is margined on the sides; aperture large, whitish; teeth of the inner lip small, distant, except two large ones in front; columella plaited; teeth of the outer lip large, blunt, distant; inside purplish. Axis $\frac{11}{10}$, diameter $\frac{6}{10}$ of an inch.

This shell varies first, in having no dorsal spot, in being more ovate, and in the base being yellowish flesh-coloured, with the mouth yellow, when it is the *C. Ovum* of Gmelin, and secondly, in being ovate oblong, without any dorsal spot, but having two black spots, one on each side of the upper part of the anterior extremity, with yellow flesh-coloured base and sides, and whitish mouth.

When barked is somewhat like *C. cylindrica*, from which it may however always be distinguished by its mouth and rather smaller spire.

I cannot willingly regard these varieties as distinct species, for some specimens in the same parcel have, and some have not, the dorsal spot, on which Linnæus founded his specific character; nor can I consider that the spots at the end are of sufficient importance, for I have observed that they gradually disappear; or at least, I have found some specimens with only one on one side and none on the other, and I do not find any other difference in the teeth, or in the essential form of the shell. Perhaps the *C. Ovum* of Gmelin is the most distinct.

50. *Cypræa icterina*.—The Jaundiced Cowry.

“Testâ ovato-oblongâ, pallide lutescente et viridescente; lineis, duabus transversis fuscatis distantibus; infernâ facie albidâ.”

Cypræa icterina. Lamarck *Ann. Mus.* xvi. 91. *Hist.* vii. 387.

Inhabits. — Mus. Lamarck.

Shell ovate oblong, yellow-white, variegated with green; with two distant transverse brown lines; the base and mouth white; axis, 1 inch.

I have not seen this species, and as it does not agree exactly with any of those which I have described, I have inserted it on the authority of Lamarck, whose character I have copied.

51. *Cypræa punctulata*.—The speckled Cowry.

Testâ ovato-oblongâ, subumbilicatâ, albidâ cærulescente, obscurè fasciatâ, punctisque fulvo-fuscis nebulatâ; basi albidâ, convexâ; marginibus luridè carneis, nigro maculatis; extremitatibus sub-bimaculatis; columellâ anticè concaviusculâ, plicatâ; labii dentibus mediis majoribus.

Icon. *Zool. Journal*, t. f.

Inhabits New Holland? Mus. J. Sowerby, Nost.

Shell ovate oblong, back convex, and as it were keeled in the middle, with three obscure purplish brown bands, and speckled with numerous bright fulvous brown specks, which are more crowded in the centre; spire convex, covered; base convex, whitish-pink, with a few scattered purplish-brown spots towards the margin; edge thickened, rounded, and very slightly extended on the sides of the anterior extremity, livid flesh-colour, with scattered small purplish-brown spots, and two largish dark blotches on each extremity; aperture rather large, white, and slightly concave in the front; teeth of the inner lip large, blunt, and distant, especially the central ones; columella, hinder part convex, smooth; front concave, deep, plaited; teeth of the outer lip blunt, rather close, with the front ones slightly larger; inside purple; axis $\frac{9}{10}$, diameter $\frac{6}{10}$ of an inch.

This species is allied by the form of the columella to the preceding section, to which I should have referred it, had it not been so nearly connected with the three following species; it has somewhat the appearance of *C. arabicula*, but is easily distinguished from it by its rounded sides and less convex back.

52. *Cypræa pallida*.—The pale Cowry.

Testâ ovatâ, subumbilicatâ, albido-cinereâ, punctis fulvis et maculis fuscis nebulatâ; basi albidâ; marginibus pallidè, fuscis nigro maculatis; extremitate anteriori marginatâ; columellâ planâ anticè plicatâ; labio dentibus mediis minoribus.

Icon. *Zool. Journal*, t. f.

Inhabits. — *Mus. Nost.*

Shell ovate, back very convex, greyish white, speckled with numerous distinct small fulvous dots, and marbled in the centre of the back with chesnut brown irregular spots; spire convex, covered; base rather convex, whitish; edge thickened, rounded, except at the sides of the front extremity, where it is distinctly margined, very pale brownish yellow, with a few scattered small purplish brown spots; aperture rather wide, white; teeth of the inner lip small, rather close, except the three or four which are placed in the front, which are large, distinct, and extended over the columella; the columella convex, smooth in the hinder part, and flat and plaited in front; teeth of the outer lip blunt, rather distant, the front ones larger; inside purple; axis $\frac{1}{10}$, diameter $\frac{6}{10}$ of an inch.

I have only seen one specimen of this shell, which I at first supposed to be a pale specimen of the former species; but on farther examination I have considered it as distinct, on account of the difference in the teeth over the columella, the extended margins of the sides of the anterior extremities, and its pale colour.

53. *Cypræa zonata*.—The zoned Cowry.

Testâ ovatâ-oblongâ, subumbilicatâ, albidâ cæruleâ, obscure quadrifasciatâ, punctis maculisque fuscis nebulatâ; basi-albido carneâ; marginibus livido-purpureis, nigro punctatis; extremitatibus nigro bimaculatis; aperturâ aurantiâ; labii dentibus distantibus, æqualibus; columellâ lævi concaviusculâ.

Cypræa zonata. Lamarck *Ann. Mus.* xvi. 80. *Hist.* vii. 386.

Icon. *Zool. Journal*, t. 7. f. 8.

2. *Incompleta*. Testâ cinereo cærulescente, interruptè fasciatâ, marginibus albido lividis, guttatis.

Cypræa zonata. Chemnitz *Conch.* x. 107. *Dillwyn R. S.* 455.

Icon. *Chemn. l. c.* t. 145, f. 1342.

3. *Decorticata*. Testâ cæruleâ interruptè quadrifasciatâ, marginibus lividis, nigro punctatis.

Inhabits Africa, *Humphreys*. *Mus. Nost.* 2. *Mus. Mawe*.

Shell ovate oblong, blueish white, ornamented on the back with

numerous brown specks, and larger spots of the same colour, shewing obscurely the four interrupted bands of the under coat; the spire convex, covered; the base convex, purplish white, with a few scattered small round blackish spots; the margin livid purple with numerous small round black spots, thickened, rounded, and slightly extended at the extremities; which have a large blackish spot on the upper part of each of them; mouth rather large, orange coloured; teeth whitish, those of the inner lip large, blunt, distant, all of nearly an equal size; columella rather concave; its whole length, especially in front, smooth; the teeth of the outer lip large, rather closer than those of the inner, pale; inside purple; axis $\frac{1}{10}$, diameter $\frac{8}{10}$ of an inch.

When the outer coat of this most distinct species is worn off, the shell is whitish blue, with four bands; the first which is near the spire, is formed of oblique transverse bands; the second is narrow and articulated, and the two next broader, formed of arrow-shaped spots; the base is nearly of the same colour as in the perfect shell.

Not being aware when I named the plate referred to above, that the shell there figured was the full grown of *C. zonata* of Chemnitz, I called it *C. maculata*.

54. *Cypræa picta*.—The painted Cowry:

Testâ ovato-oblongâ, subumbilicatâ, albidâ, obscurè trifasciatâ, punctis maculisque fuscis nebulatâ; basi albido-purpureâ; marginibus livido-purpureis, nigro maculatis; aperturâ albidâ; labii dentibus minutis, inæqualibus; columellâ lævi.

Icon. *Zool. Journal*, tab. 7; f. 10.

2. *Decorticata*. Testâ albido-purpureâ, fulvo trifasciatâ; marginibus luridis, nigro maculatis.

Inhabits African sea. Mus. Nost. J. Sowerby.

Shell ovate oblong, whitish, with three obscure brown bands, and the back ornamented with numerous pale, bright brown, specks, and scattered large spots; the spire concave, covered; the base rather convex, purplish white; the margin livid purple, ornamented with a few scattered large round purple brown spots, thickened, rounded, slightly extended at the extremities, which

are violet brown on the upper part; mouth rather wide, purplish white; teeth of the inner lip small, close, except the four anterior ones, which are larger and more distant; teeth of the outer lip larger, rather distant, blunt; columella rather convex, smooth; inside purple; axis $\frac{12}{10}$, diameter $\frac{7}{10}$ of an inch.

When the shell is worn, the back is pale purple, with three fulvous brown bands, the two end ones of which are narrow, and the central one broad, or sometimes slightly divided longitudinally into two; the base and teeth are like those of the former, only a little paler.

This species is very distinct from any other, and does not appear to be uncommon in its worn state, although I have seen only two perfect specimens.

55. *Cypræa sanguinolenta*.—The bloody-spotted Cowry.

Testâ ovato-oblongâ, cinereo-cærulescente, obscurè trifasciatâ, punctulis fulvis nebulata; basi lateribusque incarnato-violaceis, punctis minutis purpureis notatis; dentibus subæqualibus; columellâ lævi.

Cypræa sanguinolenta. Gmelin 3406. Schreiber's *Conch.* j. 59. Lamarck *Ann. Mus.* xvi. 97. Hist. vii. 395. Dillwyn *R. S.* 445.

"*Cypræa purpurata*. Solander's *Mss.*" Dillwyn.

Cypræa n. 15. Schroeter *Einl.* j. 137.

Cypræa purpurascens. Swainson *Phil. Mag.* LXI. 376.

Icon. Bonanni *Rec. & Kirch.* iii. f. 234. Argenville t. 18, f. R. Martini; t. 36, f. 265, 266! *Encyc. Method.* t. 356, f. 12!

1. *Junior*. Testâ ovatâ, gibbosâ, purpurascente, purpureo latè trifasciata, punctulis fulvis sparsis ornatâ, basi albido-violaceâ, subpunctatâ.

2. *Decorticata*. Testâ ovato-oblongâ, fuscâ, trifasciatâ; marginibus violaceis, punctatis.

Inhabits — African Seas? Mus. Nost.

Shell ovate oblong, blueish grey, with three obscure broad darker bands; the back ornamented with numerous minute fulvous specks, and often with a large perforated irregular fuscous spot in the centre; the spire conical, covered; the base and sides violet flesh colour, with scattered small round purplish spots; the edge

thickened, especially on the sides of the extremities and the outer lip, where it is slightly margined; mouth rather large, whitish violet; teeth small, blunt, nearly equal, those in the front of the inner lip being only a little larger; columella smooth, concave; inside purple; axis $\frac{10}{10}$, diameter $\frac{6}{10}$ of an inch.

When young the shell is ovate, purplish-grey, with three broad dark purple bands, and scattered with very small fulvous yellow specks, and the base is whitish violet, with or without a few scattered minute blackish-purple specks.

When worn it is brown, with three darker bands, and an irregular dorsal spot on the back, and a pale violet spotted base.

This is a well known and not uncommon species, although it has not been well figured in its perfect state. The figures of Martini and of the French Encyclopædia, appear to be from worn specimens, which probably misled Mr. Swainson, and induced him to describe it as new.

[To be continued.]

ART. XLVI. *General Observations on the Anatomy of the Thorax in Insects, and on its Functions during Flight.**
By E. T. BENNETT, F.L.S. and Member of the Zoological Club of the Linnean Society.

THE thorax or trunk is that portion of the body of an insect which is articulated in front to the head, and posteriorly to the abdomen. Entirely subservient to the purposes of motion, the whole of the organs destined to support the animal in flight, in walking, or in swimming, are attached to its various surfaces.

In all insects the thorax is divided into three segments, corresponding with the three pairs of legs with which the animals of this class are universally provided. The first of these segments

* Extracted chiefly from the "Essai sur le Vol des Insectes, par J. Chabrier." Mem. du Museum d'Histoire Naturelle.

is termed Prothorax; the second Mesothorax; and the third Metathorax. Each of these is again distinguished into its superior or dorsal portion, and its inferior or pectoral portion; the pectoral portions of the two posterior segments being termed collectively the pectoral concha.

Essentially connected as these segments are with the organs of flight, the variations which occur in these latter in the several orders of insects, are accompanied with corresponding differences in the portions of the thorax to which the wings are attached, and the diversity of appearance which has hence arisen, has frequently led to the error of appropriating a term to designate one portion of the body in one order, which is applied in another order to an entirely different part; while on the contrary, two terms have been employed to point out one and the same part, occurring under different forms in two of the orders. These errors which have arisen chiefly from the absence of general views on the subject, will be readily avoided by referring to the analogous portions of other insects, and tracing through the several orders the nature and extent of the variations which are induced by their respective habits.

In the Coleoptera, the Orthoptera, and the Hemiptera, the Prothorax is remarkable for its size, and is indeed the only part to which the name of thorax would be applied by the superficial observer, the other segments being almost entirely hidden under the elytra and wings. It is formed, in almost the whole of the Coleoptera, of a complete ring which is very solid and consists of a single piece, or of two pieces at most, so closely united as to seem soldered together in such a manner as to be incapable of the slightest motion upon each other. In the Neuroptera it is composed of two pieces; which in the Hymenoptera, the Lepidoptera, and the Diptera, are so very distinct as to be almost independent of each other; the one superior, which is sometimes soldered to the Mesothorax, and the other inferior or sternal, which is again subdivided into two other portions, one of which is anterior and the other posterior. The superior portion or collar, forms, in the Bombi, Vespæ, and Apes, a moveable ring of a single piece which

performs very essential functions during flight, while in *Tenthredo*, *Chrysis*, *Sphex*, &c. it is composed of an incomplete ring.

The internal surface of the prothorax is furnished, in common with the other parts of the body, with nervures affixed to the integuments, which serve either as supports, or for the attachment of muscles. It also bears several transverse ridges proceeding from a common centre on the inferior side, which is sometimes perforated. These have been termed the furcular branches.

This segment of the thorax takes in general no share in the action of flying, except by its vibrations. In the *Coleoptera*, *Hemiptera*, and *Orthoptera*, it appears to be designed, in some measure, as a counterpoise, during flight, to the abdomen and the portion of the trunk which is situated behind the wings, and thus to facilitate the passage through the air, which is considerably impeded when these latter parts are so heavy as to destroy the horizontal position. Its principal use is to afford a strong point of attachment to the powerful muscles of the anterior legs, and hence it is requisite that it should be free during flight in the *Libellulæ*, as these insects seize their prey by means of these feet, and devour it while on the wing.

The organs of flight are always affixed to the two posterior segments of the thorax, which may be termed collectively the wing-bearing trunk, or the two alar segments; and may be distinguished into the anterior or middle alar segment, (*Mesothorax*), and the posterior alar segment, (*Metathorax*.) These segments, corresponding in size to that of the wings which they support, are nearly equal only in the *Libellulæ*. In these insects, in which the muscles of flight to each pair of wings are also equal, these segments are not inclosed the one within the other, and are only united in their pectoral portion where they appear soldered together. This intimate union of the sternal portions of the two alar segments, exists also in the *Coleoptera*, in the *Grylli*, *Cicadæ*, and *Pentatomæ*, in the greater number of the *Hymenoptera* and in the *Diptera*.

The *Mesothorax* is often of considerable size, as in the *Hymenoptera*, the *Lepidoptera*, and the *Diptera*; it bears the superior wings and contains the principal muscles of flight which are com-

mon to the two pairs of wings when they both exist ; it occupies in these orders a considerable portion of the capacity of the posterior segment, which is thus prevented from affording attachment on its internal surface to any but small auxiliary muscles of flight, or those which are adapted to extend and fold the inferior wings.

The Coleoptera and Orthoptera are the only orders in which the posterior alar segment is the principal one, or that which bears the true wings ; in the Coleoptera alone this segment also contains the muscles of flight common to the wings and the elytra. The middle segment in these orders, the place of which is almost entirely occupied by the Metathorax, and which is capable of affording attachment to very small auxiliary muscles alone, destined to open and to close the elytra, takes only a very small share in the action of flying.

The pectoral concha or the sternal portions of the two posterior segments of the thorax, corresponds in its functions with the sternum, the ribs, and the clavicles of birds ; it consequently affords a support to the wings, and a point of attachment to many of the muscles concerned in flying. But as in insects the whole of the muscles are internal, it is therefore necessary that all the parts to which these must be affixed, should also be placed internally ; and hence the analogous structure to the crest of the sternum in birds, should be sought for on the internal surface of the parietes of the thorax. This appears to be the Entosternum, an internal solid part which is frequently bifurcated, and which is situated in the middle of the sternal portion of the chest. It is met with in all insects, and furnishes a strong point of attachment to numerous muscles ; but it is peculiarly remarkable in many of the Coleoptera, in which its posterior portion has been called furculaire or furcular branches, from its forked appearance approaching very nearly in form to that of the letter Y.

The supports of the wings are always the most solid portion of the framework of the trunk, and are frequently strengthened by nervures or by other contrivances : in all insects their superior extremity is curved inwards. These supports or thoracic clavicles, are articulated sometimes immediately with the base of the wing (which is situated above in a transverse direction, so as to be

divided by them into an external and internal portion,) and at others with this base and the dorsum by the intervention of small bones. In the Coleoptera the supports of the elytra are denominated anterior or scutellar clavicles; and the term of fulcral plates is given to the scales to which the supports of the wings are affixed.

From the nature of its functions, the wing-bearing trunk requires to be alternately dilated and contracted during flight; and in consequence of this necessity the several pieces of which its dorsal portion is composed are loosely connected together only by ligaments varying in number and in elasticity. The most considerable of these pieces is called preeminently the dorsum; with this the wings are articulated, and to this the principal muscles of flight are attached, except in the Libellulæ, in which these muscles are inserted directly into the wing. There exists a distinct dorsum for each pair of wings, the size of which is constantly proportionate to the importance of the wings, and to the power of the muscles of flight which are affixed to it. It is convex above and concave beneath, and is frequently divided by a longitudinal line into two equal and similar parts. Its margins are always curved more or less downwards; and the lateral ones are furnished with apophyses, termed humeral, by which they are articulated with the internal side of the base of the wings, either immediately, or by the intervention of small bones. The other angular portions of its margins serve for its articulation with other contiguous parts.

In the Coleoptera the body of the dorsum is covered during rest by the wings and the elytra; and its anterior portion, contracted into the form of a neck, and covered above by a simple membrane, is hidden under the scutellum with which it is articulated. It is terminated in front by a transverse and nearly vertical half septum, the prædorsum or cervical septum; into which are inserted the anterior extremities of the dorsal muscles, which in the greater number of the other orders are attached to the fore part of a considerable portion of the middle third of the dorsum.

In the Acrydia the anterior portion of the dorsum does not become at all smaller for the purpose of being inserted into the pro-

thorax; it is contracted in the Cicadæ; while in the Pentatomæ, it is on the contrary the broadest part of the dorsum that is covered by the prothorax. In many of the Hymenoptera, the dorsum is terminated in front by a kind of button which penetrates into the collar, and is freely articulated with it. In the other orders this part does not enter into the prothorax.

In the Hemiptera, the Hymenoptera, the Lepidoptera, the Diptera, and in some of the Neuroptera, the dorsum of the superior wings is much larger than that of the inferior ones; this latter is reduced almost to nothing in the Diptera in which there exist only rudiments of posterior wings. It is on the contrary the principal one in the Coleoptera and the Orthoptera; and in the Libellulæ, the two dorsa are equal.

It is generally through the intervention of the proper motions of the dorsum, which are very considerable during flight, that the wings or the elytra are moved equally and simultaneously. Thus when it is elevated it carries with it the internal side of the base of the wings with which it is articulated, from which ensues the depression of the external side of the wing; and when it approaches the sternal portion of the trunk, the contrary takes place, and the wings are raised. During the depression of the wings, the dorsum is curved from before, backwards, or in such a manner that its anterior extremity is brought nearer to its posterior, that its middle is elevated, and its lateral portions removed farther from each other. The reverse takes place in the elevation of the wings; the anterior extremity of the dorsum being removed to a greater distance from the posterior, its middle being depressed, and its sides brought nearer to each other. Thus its bending in one direction produces a diminution of its curve in the direction normally opposed to it; and by the alternations of this motion, assisted by other means, the body is alternately compressed and dilated, and the wings are raised and depressed by turns.

The dorsum is connected behind to the body and the two branches of a semicircular piece, the podorsum or post dorsum, which is susceptible of a spring and performs the office of a lever, and which has therefore been occasionally termed the bascule or

bascular appendix. This is intimately united to the dorsum in all insects, excepting some of the Hymenoptera, the Vespæ, Bombi, Apes, &c. in which it is nearly free, being attached only by a single small muscle from the anterior and internal extremity of each branch.

In all insects, with the exception of the Libellulæ, the dorsal muscles or the depressors of the wings are attached posteriorly to the concave surface of a kind of transverse septum, which is very convex behind, free in the posterior part of its superior and inferior margins, and the sides of which alone are articulated with the pectoral concha, and often (as in the Acrydia, Cicadæ, Papiliones, and Diptera) intimately united with it. This part is termed the costal, or costal septum, on account of its functions in flight, which correspond in some measure with those of the ribs of birds, inasmuch as like them it serves for a posterior attachment to the depressor muscles of the wings and the dilators of the trunk. In all insects, with the exception of some of the Hymenoptera, the costal septum forms the immediate separation between the thorax and the abdomen, and may hence be regarded as a kind of diaphragm. Its inferior portion is in general directed backwards; but the contrary takes place in many of the Hemiptera, this portion being in them directed forwards and connected by elastic ligaments to apophyses of the sternum. In those Hymenoptera, the abdomen of which is pedicelled, as Ichneumon, Spheæ, Vespa, &c. the costal is entirely involved in the interior of the metathorax, articulating itself, by its branches only, with the bascule and with the small bones of the base of each wing; while in almost all insects with a sessile abdomen the attachment is formed by a very strong and loose ligamentous membrane, extending from the uncovered and free posterior portion of the upper margin of the costal, and which protects the interior of the trunk and is alternately stretched and relaxed during flight. The only exception from this structure is in the Acrydia, in which the costal septum is divided into lobes and is situated entirely within the trunk, having its superior margin anteriorly united intimately and immediately with the bascular appendix, and posteriorly

attached to the integuments which cover the origin of the abdomen above.

In the *Libellulæ*, the depressor muscles of the wings are attached like the levators, below to the sternal portion of the chest, and not to internal transverse septa; these latter pieces nevertheless exist, but their office is partly changed; they are in these insects rejected to the outside, and form an integral part of the integuments of the wing-bearing trunk, which they contribute to dilate.

ART. XLVII. *Description of an hitherto unpublished Species of Buccinum, recently discovered at Cork. By E. T. BENNETT, F.L.S. and Member of the Zoological Club of the Linnean Society.*

Buccinum Humphreysianum, testâ ovato-conicâ, tenuiusculâ transversim creberrimè striatâ, sordidé carneâ; ultimo anfractu zonis tribus duplicatis, brunneis, albo sparsim maculatis, superiore subobsoletâ; columellâ lævi; labri margine subreflexo.

Shell ovate-conical, thin, horn-coloured, with numerous transverse striæ; the last whorle with three double bands, (the upper one nearly obsolete,) which are brown, irregularly spotted with white; columella smooth; margin of the labrum slightly reflected.

Description. Whorles eight, convex, finely and closely striated in a transverse direction; striæ slightly waved, and crossed by very minute longitudinal lines. Bands on the lower whorle six, narrow, disposed in pairs, brown, irregularly spotted with white, gradually disappearing on the upper ones. Columella smooth, white; aperture horn-coloured; lip white, slightly thickened and reflected at the margin. Canal very short, with a slight tinge of violet behind it.

Length 2 inches; breadth 1 inch.

Inhabits the harbour of Cork.

Of this pretty and interesting addition to the list of British shells, only three specimens have yet been found, for one of which I am indebted to the kindness of my friend, Mr. John D. Humphreys of Cork, a very assiduous and intelligent Conchologist, by whom it was first pointed out as a distinct species. Of the species of *Buccinum* hitherto described, it appears to approach most nearly to the *B. Norwegicum*; but from this it amply differs in its less elongated form, in the absence of the grooves which that shell possesses in addition to the striæ, in the regular convexity of its whorles, which are not flattened at the top, and in the smoothness of its columella.

The whole of the specimens were alive when brought to Mr. Humphreys, whose name I have commemorated in the specific appellation. They exhibit slight vestiges of an epidermis, which seems however to have been rubbed off by the fishermen, probably with the design of rendering the shell more attractive.*

ART. XLVIII. *Observations on Melania Setosa, in reply to Mr. Gray, by WILLIAM SWAINSON, Esq. F.R. and L.S. M.W.S. &c.*

[In a letter addressed to the Editors of the Zoological Journal, 15 Aug. 1824.]

GENTLEMEN,

IN the last number of the Zoological Journal, I perceive you have given insertion to a paper by Mr. J. E. Gray, professing to be "On the Structure of *Melania Setosa*;" but which, in reality, is intended to criticize my account of that shell, recently published.

The spirit which pervades this paper, I am sorry to see is, diametrically opposite to that liberal and courteous tone of inquiry which alone belongs to the true votaries of science; while the

* Since the above was sent to press, I have received several specimens of this Shell from the coast of Newfoundland, which shew scarcely any vestiges of the brown bands. G. B. S.

arguments themselves are either so trivial, or so obscurely stated, that it is difficult to shape a reply to those parts really deserving notice. It is however due to the readers of your journal, that I should make some comments upon this production. Mr. Gray's object appears to be two-fold, and to aim at proving, 1st. That *Melania setosa* is not a new shell; because specimens have for many years been in the British Museum; and because it is named in the manuscript catalogue of that collection: 2ndly That this shell presents nothing extraordinary in its construction; because certain other shells are stated to have a similar structure.

The first of these propositions, notwithstanding its novelty, may be answered in a few words. Until now, Naturalists have considered a species to be *new*, which has not been described or figured in any printed book. But, according to the singular doctrine of this writer, we are bound to make the tour of all the museums—public or private—native or continental, and consult all their manuscript catalogues, before we venture to say we are describing a new object. *Melania setosa* appears to exist in the British Museum, and to be named in the manuscript catalogue. The shell may be in a dozen collections, and have a dozen manuscript names, for ought I know to the contrary. What follows? Why, that the shell is not new to science; although it has confessedly never been described, or publicly recorded!

In supposing the figure of Lister (tab. 1055. f. 8) to represent *Melania setosa*, Mr. Gray sets himself in opposition to Linnaeus, Gmelin, Martini, and Lamarck, who have all quoted this identical figure as representing *Melania amarula*, Lam. Yet, setting aside these authorities, (which Mr. Gray seems to think may be done without notice or comment,) we shall find on referring to Lister, not the slightest appearance of those bristles peculiar to *M. setosa*, to be represented in the figure; which thus agrees with Mr. Gray's own account of *M. amarula*.

Mr. Gray then proceeds to describe in a phraseology of his own,*

* Conchologists for the last hundred years have been so blind as to mistake the *top* of a shell for the *bottom*, and vice versâ. We are instructed by Mr. Gray, to call the apex of a shell, its *base*; and what we have hitherto "culpably" termed the base, we must in future call the apex or top. Concholo-

the formation of these spines, &c.—but as he does not here impeach the accuracy of my previous description, I shall pass over this part of his remarks; except, indeed, that passage, wherein he states that the spines of *Neritina corona*, Lam., like those of *Melania setosa*, are tubular. How different this is from the real fact, need not be told to Conchologists; but for the information of such as do not possess this scarce shell, I shall just state how its spines have been described by the greatest naturalists who have written on the subject.

LINNÆUS. *Nerita corona*. N. testæ anfractibus *spinis coronatis*, labiis edentulis. Mus. Lud. Ulr. p. 676. n. 387.* and again, *Spinæ unfractuum cylindricæ, decem, rectæ, aliquot lineis longæ*.

MÜLLER. *Nerita testa dilatata convexa striata fusca: aculeis longis nigris*. Hist. verm. 2. p. 197.

CHEMNITZ. Testa imperforata, epidermide nigerrima superinduta, vertice intruso, *corona spinarum valde elongatarum cincta*, labio acuto exciso, labio plano edentulo. Conch. Cab. 9. p. 68.

GMELIN. Testa minuta, interdum tota nigra, *spinis longioribus vel brevioribus armata extrinsecus tenuiter striata: spiræ anfractu primo magno, reliquis convexis*. Sys. Nat. 1. pt. 6. p. 3676. n. 26.

LAMARCK. *Neritina corona*. Testa globoso-oblongâ, striatâ, nigrâ; ultimo anfractu superne *spinis longis erectis coronato*; apice eroso; aperturâ albâ labio denticulato. Hist. Nat. des Animaux sans vertèbres, vol. 6. p. 2. p. 185. n. 8.

Had these spines been really tubular, it is almost incredible that such a remarkable structure should have been overlooked by each, and all of these eminent writers. I could add many other analogies to those pointed out by Mr. Gray, and equally remote from the question at issue—namely the *peculiar* structure of *Melania setosa*: for, admitting all these analogical resemblances to exist, the

gists will be amused by many more of these important discoveries, in Mr. Gray's conchological axioms.

bristly structure of this shell remains unique. Mr. Gray has yet to learn the difference between analogy and affinity. For it is rather curious to see the manner in which he confounds them. After enumerating certain analogous resemblances in other shells to the tubular spines of the *Melania setosa*, Mr. Gray, (quite forgetting its *bristles*,) very logically concludes by saying, "that it does not *therefore* exhibit any anomalous formation." I have stated, that these bristles appear imbedded at their base in the very substance of the shell. This is denied, and an argument used, which any one would think, was intended to verify my supposition. Mr. Gray's reason, and the inference he draws from it, are as follows. "The base of the tube at length becomes closed by the deposition of shelly matter on the inside, and thus they (*the bristles!*) do not become imbedded." Why this deposition of shelly matter, should not be the very substance that *would* imbed the base of the bristles, is altogether inexplicable.

I now come to the figures of this shell; which from the known accuracy of Mr. Sowerby, I take for granted are correct portraits of those which Mr. Gray has examined. These figures represent two mutilated specimens. The spines and bristles in the smallest are much broken; while in the larger shell the spines are no less injured; and the bristles totally gone! From such materials has this writer drawn his observations.

I am fearful, Gentlemen, that I have occupied too much of your time, as well as of my own, in noticing this frivolous production, which with its reply, can do little honor to the pages of your Journal, filled, as they should be, with communications of far greater importance.

A Journal expressly devoted to Zoology, is altogether a novelty among British Naturalists, and as many will be eager to take advantage of the facility it offers of communicating their remarks to the public, it may be as well to suggest a few hints to such as, in a good spirit, aspire to be enrolled in the annals of their favourite Science. Let us not believe, however, that this distinction is to be gained by dressing the ideas of others in a new phraseology of our own; or by attacking their opinions, before we well understand their meaning. Neither is fame to be acquired by as-

suming a tone of confidence and dictatorship, in a science, wherein those, who know the most, confess they know the least ; or by arguing upon trifles with a captious and disputatious spirit. No; the true Naturalist is he who studies much, and who writes little. He, who after patient investigation, brings to the discussion of contrary opinions, a liberal, a candid, and a *gentlemanly* spirit ; more anxious to elicit truth, than ambitious of holding up his little discoveries. It is to men whose minds have been thus stored, and whose feelings are thus regulated, that the world is indebted for the *Systema Naturæ*, the *Regne Animal*, and the *Horæ Entomologicæ*. It is to such examples we must look as guides ; relying upon this, that however the generality of mankind may be struck by a display of words, the great body of Naturalists, (who alone can confer the laurel wreath of fame) will never be persuaded to take "assertion for proof, obscurity for depth, or perplexity for argument."

I remain, Gentlemen,

&c. &c.

WILLIAM SWAINSON.

ART. XLIX. *On the vestiges of a placental Organization, and of an umbilicus, discovered in a very small Fœtus of the Didelphis Virginiana.* By M. E. GEOFFROY DE SAINT-HILAIRE.*

SINCE the publication of my work on the generation of marsupial animals, I have ascertained some new facts which singularly modify certain assertions concerning the developement of marsupial fœtuses that I made on the authority of others. I am indebted for this acquisition to our learned Botanist M. Turpin, who had no sooner heard of my work, than he had the goodness to furnish me with the fœtuses of the *Didelphis Virginiana*, perfectly preserved in spirits. They were given to him by Dr. Barton, as he was about to quit America, who informed him that he had taken

* From the *Annales des Sciences Naturelles*.

them from their mother, very soon after their introduction into the pouch. The size of these little animals, was rather more than five lines ($\frac{5}{12}$ inch French), from the extremity of the nose to the insertion of the tail.

These fœtuses were already formed, which leads me to think that Dr. Barton is mistaken, as to the moment of their entering the pouch. I have attentively observed, and even dissected these very small animals, and moreover, I have had magnified drawings made of them six times the natural size. What I have learnt by studying these preparations will add much to the facts which I have already stated respecting the developement of marsupial embryos. Sir Everard Home, in 1795, in treating of the sexual organs of the Kanguroos, announced an unusual circumstance, and described a fœtus without the umbilical cord: Barton heard of it, and hastened to verify so extraordinary a fact, and found it correct as far as regards the fœtus of his Didelphes. M. de Blainville reverted to these results, and announced (*Bulletin des Sciences*, 1818, p. 24,) "that he had been unable, notwithstanding the utmost care, to discover in the fœtuses of marsupial animals, either vein, umbilical artery, urinary passage, (ouraque) suspensor-ligament of the liver, or thymus."

In short, here are animals constituted like the mammifera, and which are true mammifera, and yet present such anomalies! They do not begin, but they end in being mammifera! It is true I quoted these observations, made before my own, but still I thought I perceived, not without regret, a sort of contradiction in them. For it was in some measure a misunderstanding of the spirit of organic developement. Every generation is necessarily established in a successive order: the first produced organs engender those to come, for they contain the germ of those which are to appear afterwards. Good sense alone would have boldly asserted that the cause of the existence of the second was visibly written in the existence of the first.

These objections dwelt upon my mind; but what are arguments opposed to facts? I submitted, and I adhered to the facts, without troubling myself any further with logical rules which tended to lead me away from them.

At length however, the fœtuses which I possess, through the generosity of M. Turpin, have demonstrated that these facts have been incorrectly given; I have observed in them evident vestiges of placental organization, and of an umbilicus. But it was necessary to go farther, and ascend by observation nearer to the origin of those organic formations, in order to discover the first elements of the constitution which characterises the mammifera.

The researches which gave rise to the preceding remarks were all directed to animals already received into the pouch; but if more reflection had been bestowed on the subject, the surprise, occasioned by the appearances of their developement would have been much diminished: for could these animals produce in this supplemental pouch, this *second domicile*, as Barton calls it, an organization, which in truth, is only compatible with all the dependencies of the first? A placenta, an umbilical cord, and enveloping membranes, belong to the fœtus in the *aduterum*, one of the parts of the sexual canal. These would be observed in a fœtus in that pouch, or the first *domicile*; but no one has hitherto procured us this observation. Barton attempted it without success, evidently for want of perseverance. He was afraid of sacrificing individuals which he never possessed in sufficient number to submit them to multiplied experiments.

However it may be, two young males of the fœtuses presented to me by M. Turpin, have evidently a large umbilical aperture, large, I mean, in comparison with their very small size. I say the two males, and not the third individual, which was a female, lest it should be thought that I mistook the entrance into the pouch for the vestige of an umbilicus. There is both the vestige of an umbilicus, and a scrotum below it, in the males.

Thus, by this observation we return to the common course of the mammifera; for we see, at the commencement of the formation, all the essential parts, on which, in a more advanced stage, will depend the characteristic distinctions of the mammifera. The same series of transformations occurs in all these animals, ovulum, embryo, and fœtus. These three states of genital products require three distinct situations, which, in the normal mammifera, are found within the sexual canal; but in the marsupial

they are very differently distributed, though in an equally continuous series. The ovulum and the embryo are formed and developed in the sexual canal, and the fœtus out of it. The matrix is the third pouch in the normal mammifera, the pouch of incubation and nourishment; the marsupium becomes this third pouch with respect to the second. The difference therefore is solely in the fœtal domicile; we call it matrix in the one, and pouch, or marsupium in the others.

As to the vestiges of placental organization that I have observed, I have seen, and my figure distinctly shews, a certain quantity of papillæ. Are these the *suckers* of a placenta which have not had time to be effaced? This organ could not have lasted long enough to have grown in the same proportion, and produce a long umbilical cord, as in other mammifera. This placenta would have been sessile, an expression I borrow from the botanists; it would have been fixed to the lower belly, and in some measure, have grown like certain flowers which live implanted on woody substances, without any intermediate pedicles.

Or the vestiges that I discovered, might be merely the umbilical cicatrix; and in that case the placenta and its cord would have already perished and disappeared. Only direct observation can establish either of these hypotheses.

May we not hope that Naturalists, throughout the two Americas, India, and New Holland, will second our efforts to complete the observations we have made, and which can only be made advantageously where Marsupial Animals abound.

ART. L. *Observations on the Structure of the Pholades.* By
JOHN EDWARD GRAY, Esq. M. G. S.

THERE is no family of Conchophorous Mollusca, where the means by which they open and shut their shells have been so much misunderstood, and consequently involved in so much obscurity as the *Pholades*. This obscurity arises from the dif-

ference in the structure of the hinge from the rest of the bivalves, which was first hinted at but not explained by Dr. Leach.

The valves of most of the species of this family have a portion of the inner part of their shell reflected over their beaks: this portion appears usually to be formed of two plates, which are sometimes very distinct from each other, and have cells between them.

The valves are connected together by a thin membrane, which often has shelly matter deposited on it in the form of one or more plates. The front part of this membrane appears to be continued along the inner edge of the reflected portion, to its central and most convex part, where it forms a roundish piece of ligamentous matter, which when rubbed off, leaves a scar that marks its place; this ligamentous matter appears to perform the office of keeping the valves more steadily attached to each other, and at the same time it affords a very complete fulcrum for the action of the muscles which separate and close the valves.

To the outer surface of these reflected plates is fixed a muscle, formed of transverse fibres; this muscle, assisted by the reflected plates, which from their convex shape act as a lever, opens the valves by the contraction of its fibres. It is mostly covered by a membrane arising from the outer edge of the lower, and most extended of the reflected plates, in which membrane one or more shelly plates formed similarly to the valves of shells, and called by Linneus accessory valves, are often imbedded; but in those animals that are always enclosed in a shelly tube,* as the *Teredines*, the muscle is only covered by a thin skin, as the shelly tube protects it.

Thus the valves of this family are opened in a manner directly the reverse of other bivalves, for here instead of the ligament being external, and the elastic cartilage on the inside of it, the ligament is internal, and the muscle which performs the functions of the cartilage is placed on the outer dorsal side of it.

* These tubes appear to be a lining deposited on the inside of the hole, for the purpose of affording a smooth surface, for the protection of the very much elongated body of the animal; they are often furnished with incomplete transverse dissepiments, especially at the posterior extremity.

From the natural station and habits of these animals, which are usually confined to holes in rocks or wood of nearly their own size, the valves of their shell are only endowed with a very limited degree of motion, especially in some species, as in the *Pholas pusillus*, where the basal margins are connected together by a thin membrane, which has a shelly plate imbedded in it, similar to that of the dorsal membrane.

In most other Conchophorous Mollusca the valves are closed by two adductor muscles, the posterior of which is mostly attached to the posterior surface of the shell. I have however, observed it in a very beautiful specimen of *Pholas costata*, attached to a plate-like process, similar to those to which the muscle is attached in the genus *Cucullæa*; and in the *Pholas Dactylus*, this muscle is placed obliquely, so that the scar left by its attachment in the left valve is quite close to the dorsal margin, while that in the right valve is placed at some distance from it; the anterior adductor muscle is placed just before the hinge, or the anterior dorsal margin of the shell, at the hinder part of the gape. These two muscles appear also to be assisted, as in some other bivalves, by a bundle of muscular fibres, which is situated at the posterior basal edge of the submarginal scar, just at the angle where the syphonal scar commences, the latter sometimes leaves a considerable muscular impression.

From the inner part of each of the valves of this genus, just under the nucleus, arises a process, which from its being usually somewhat sickle-shape, may be called the *falciform process*. It has usually been called by all Conchologists a tooth, but it is not placed similarly to the teeth of other bivalves. I am inclined to differ from several celebrated Conchologists, who consider that the hinge of this genus is destitute of teeth, as there are always one or more ribs on the hinge margin, which answer the same purpose as teeth in other shells, keeping the valves in their relative position one with another; I am therefore inclined to call them teeth.

These processes vary slightly in their shape in the different species, in *Pholas costata* and *P. Dactylus*, &c. they are expanded at the end and exhibit several concentric striæ. On *Pholas*

falcata they are thin and hooked at the extremity, and in *P. crispata* they are thin and nearly cylindrical; but they always keep their incurved form, and their extremity is always placed obliquely, that is, with their anterior portion nearer the centre of the shell.

To each of these processes there is attached a muscle, which was pointed out to me by my friend, Mr. James Sowerby, and which arises from the foot of the animal; I agree with him in thinking it must greatly assist them in boring, as by withdrawing the centre of the expanded disk of the foot, the animal, by the pressure of the atmosphere, will be strongly attached to the rock, and thus be furnished with a fulcrum to rasp away the surrounding medium, by means of a semirotatory motion, which would be produced by the alternate action of these muscles.

From the want of specimens preserved in spirits, I have not been able to determine accurately the precise direction and point of origin of this muscle; nor have I had an opportunity of examining the animals in their natural habitations. The above conclusion is greatly supported, first by the peculiar form of the end of the foot, of all the species of this family, which alone appears to bore by means of rasping; and secondly by the oblique position of the end of the falciform process to the back of which the muscle is attached.

ART. LI. *Descriptions of some rare, interesting, or hitherto uncharacterized subjects of Zoology; by N. A. VIGORS, jun. Esq. M. A. F. L. S. With Figures by JAMES DE CARLE SOWERBY, Esq. F. L. S.*

THE number of subjects in every class of zoology which have hitherto remained undescribed in our cabinets has long been a reproach to this country; and any attempt to remove it by characterizing a portion, however limited, of our hidden treasures, needs no apology or preamble. It is my intention to give descriptions

through the medium of this journal, as far as its limits will permit, of such animals as may be unknown to the scientific world in general, adding occasionally the details of some others, which though already elsewhere described, may have a peculiar interest to the naturalists of this country. Written descriptions in general convey but an inadequate idea of the productions of nature; but when they are accompanied by such superiour figures, as will be supplied by one of the most eminent artists of our days, I feel a confidence that the present attempt will be satisfactory to the lovers of science. The descriptions will follow each other as the subjects occur, without any views of systematic disposition.

Subregnum. VERTEBRATA. Auct.

Classis. AVES. Auct.

Ordo. INSESSORES. Mihi.

Tribus. DENTIROSTRES. Cuv.

Fam. MUSCICAPIDÆ. Mihi.

Genus. MUSCICAPA. Linn.

LATHAMI. *M. atra, pectore abdomineque purpureo-rubris, fronte crissoque albis.*

Tab. 13.

Habitat in Novâ Hollandiâ.

In Mus. nost.

Long. corp. $4\frac{1}{4}$.*

This species is closely allied to *M. erythrogastra*, Lath., but may be at once distinguished from it by the total absence of white from the wing and tail feathers, from the deeper black of the head, back, and tail, and from the strong purplish red of the *abdomen*, which is bright scarlet in *M. erythrogastra*. There is a mutilated specimen in the collection of the Linnean Society, which as far as can be judged from its imperfect state, accords with my bird, with the exception of the outer tail feathers being internally margined with white. Dr. Latham in his description of *M. erythrogastra* particularizes a variety which appears also to approach the bird before us. But, although the former species seems to vary considerably, I cannot conceive that so total an

* My measurement throughout is in inches and their component parts.





alteration could take place in its colour as to identify it with the present species. There is a character also, which belongs to some of the Australasian *Muscicapidæ*, that of the shafts of the tail feathers being prolonged, so as either to stand naked beyond the webs, or to form an angle with them, making the *apex* of the feather pointed, instead of round as in general; and which though discernible in both the species before us, is much more considerably developed in *M. Lathamii* than in *M. erythrogastra*. The length moreover of all the specimens of the latter species, which have come under my inspection, exceeds that of the former, by nearly half an inch. I have named the species in honour of the venerable authour of the "General Synopsis of Birds," the Father of Ornithology in this country.

The extensive group of birds that forms the genus *Muscicapa* of Linnæus exhibits several varieties of structure that have long since required to be separated and characterized. I am happy to have it in my power to add that the subject has been taken up, in conjunction with that of several neighbouring groups, by my friend Mr. Swainson, by whom the scientific world may expect to have it handled with ample justice. I consequently refrain from making any observations on the natural affinities of the bird before us and its congeners of New Holland, but shall refer it provisionally for the present to the overgrown genus *Muscicapa*.

Fam. SYLVIADÆ. Mihi.

Genus. ANTHUS. Bechst.

RICHARDI. Vieill. *A. olivaceo-fuscus, albido nigroque varius, subtilus albidus, pectore rufescente maculis nigris, rectricibus duobus externis albo-marginatis; pedibus hallucisque ungue longissimis.*

Tab. 14.

Habitat in Angliâ.

In Mus. nost.

Long. corp. $6 \frac{7}{10}$.

Anthus Richardi. Vieillot. Dict. d'Hist. Nat. Art. *Pipi*.

————— Temm. Pl. Col. 101.

Although the above species has been recently described by M. Vieillot, and admirably figured in the "Planches Coloriées," I am

induced to have it represented in the present number of this journal, as it forms an interesting addition to the Ornithology of the British Islands. The specimen, from which the accompanying figure has been taken, was captured alive some time since in the neighbourhood of London, and is now in my collection. It is a young bird and nearly in the same state of plumage as the bird figured by M. Temminck; the adult bird is distinguished by the greater strength of the colouring in general, and more particularly of that of the spots on the breast. The species is at present included in the genus *Anthus*; but the intelligent observer will at once detect a striking deviation from the type of that group, in the length of the legs and the hinder claw. In the former character the bird seems to correspond with the *Megalurus* of Dr. Horsfield, in the latter to approach the true *Alda* of Authours. I have laid a more detailed account of this recent addition to the British *Fauna* before the Linnean Society, to which I must refer the reader for further particulars, and a more enlarged description.

Tribus. SCANSORES. Auct.

Fam. PSITTACIDÆ. Leach.

Genus. PSITTACULA. Kuhl.

KUNLI. *P. flavo-viridis, gutture, genis, pectore, abdomineque coccineis, cristâ occipitali, fasciâque abdominali purpureis, rostro pedibusque rubris.*

Tab. 16.

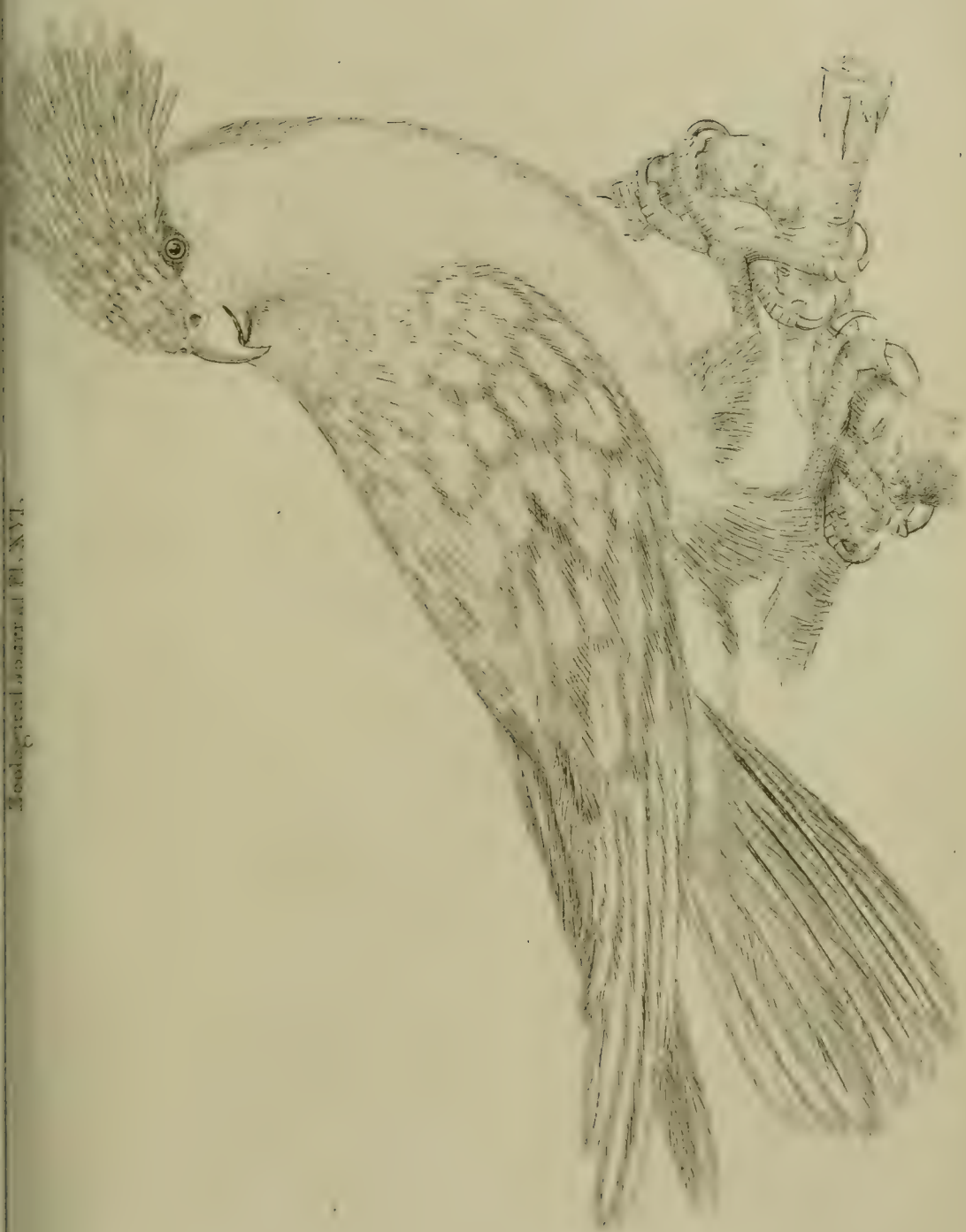
Capitis vertex nitidé viridis. *Irides* aureo-rubri. *Rectrices* coccinei, purpureo-marginati, apice viridi. *Crissum* viride.

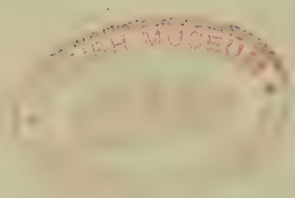
Long. corp. circiter $6\frac{3}{4}$.

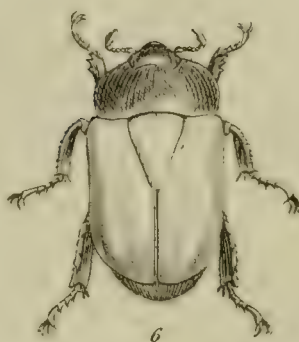
Habitat in Ins. Toohooteteroo hæ Maris Pacifici.

In Mus. Dom. Cross.

We are indebted for the representation of this new and beautiful Parroquet, to the liberality of Mr. Cross of the Exeter Change Museum, who lately received several specimens of it from the island above named, situated a day's sail from Otaheite. The bird from which I took my description being alive and very wild, I have not been able to enter into its characters as far as I should wish. I have named it after the late M. Kuhl, who has left us a







valuable disquisition upon the present family, and whose early loss cannot be sufficiently lamented by the lovers of Ornithology.

The species approaches very closely to the *P. pipilans* of Dr. Latham, [*P. fringillaceus*, Gmel.] which also belongs to the same quarter of the globe; but besides other characters, it may at once be distinguished by the scarlet colour of the breast and *abdomen*, both of which are green in that bird. See SHAW's Miscellany, pl. 1; and LE VAILLANT Hist. des Parroquets, pl. 71.

Subregnum. ANNULOSA. Auct.

Classis. MANDIBULATA. Mac L.

Ordo. COLEOPTERA. Linn.

Tribus. CHILOPODOMORPHA. Mac L.

Stirps. GEODEPHAGA. Mac L.

Fam. CICINDELIDÆ. Mac L.

Genus. CICINDELA. Linn.

PRINCEPS. *C. atra*, *elytris tribus fasciis aureo-flavis; humerali abbreviatâ subquadratâ, mediâ latâ subincurvâ transversâ, apicali angustâ.*

Tab. 15. f. 1.

Caput rugose striatum. *Labrum* quinque dentibus mediis acutis duobusque lateralibus obsoletis instructum, nigrum, maris in medio flavescens. *Mandibulæ* nigrae, ad basin flavescentes. *Palpi maxillares* nigri, articulorum apicibus flavis; *labiales*, articulis tribus primis maris flavis, fœminæ nigris, ultimo nigro, tertio pilis albidis hirsuto. *Thorax* rugosus. *Elytra* glabra. *Abdomen* supra purpureo-atrum, metallice nitidum. *Antennæ* mediocres. *Pedes* maris longi, fœminæ mediocres.

Long. corp. $\frac{5}{6}$.

Habitat in India Orientali.

In Mus. Dom. Mac Leay, nost.

This insect was first brought to this country by Major Sale of the East India Company's service. It made part of a superb collection formed by that gentleman in the immediate vicinity of Madras, which was particularly rich in new forms and splendid specimens. Some of these I hope to make known to the publick occasionally through the medium of this journal. The collection to which I allude was the fruit of the few hours of leisure and re-

laxation which that intelligent officer was enabled to command amidst the duties of his profession; and it affords an example of how much can be effected by those, whose professional services abroad afford them an opportunity of resorting to a similar employment of their leisure time: an employment, as conducive to their own gratification and amusement, as to the benefit of science.

RITCHIE. Leach's MSS. *C. atra*, *elytris fasciâ mediâ recurvâ clavatâ abbreviatâ*, *apicali angustâ*, *quatuorque punctis*, *ultimo interfasciali*, *albis*.

Tab. 15. f. 2.

Caput rugis striatum. *Labrum* tridentatum, album. *Mandibulæ* ad basin albidæ. *Palpi labiales* articulis tribus primis albidis, ultimo nigro. *Thorax* rugosus, marginibus pilis albidis hirsutis. *Elytra* punctis impressa, fasciâ mediâ literæ S scriptæ persimili. *Abdomen* subtus nigrum, lateribus albidè hirsutis, supra atrocæruleum, nitidum. *Pedes* atrocærulei, metallici, pilis albidis instructi.

Long. corp. $\frac{2}{3}$.

Habitat in Africâ Boreali. Mourzouk.

In Mus. Britan. Dom. Mac Leay, Kirby, nost.

This insect formed part of a collection sent home to the British Museum from the southern territories of Barbary, by the late Mr. Ritchie, who unfortunately for the cause of zoology, has been added to the number of the victims whom the love of science led to a premature death in the inhospitable regions of Africa. It has been since distributed among the principal cabinets of this country, from a collection formed in the same territories by Captain Lyon, R. N. the enterprising companion of Mr. Ritchie. The specifick name justly attached to it in honour of its first observer, is found among the MSS. of Dr. Leach in the British Museum, but without any description of the insect.

LYONII. *C. atropurpurea*, *elytris margine laterali angusto*, *lunulâ humerali apicalique*, *fasciâque mediâ recurvâ clavatâ vix interruptâ*, *albis*; *antennis nigris*, *tibiis atropurpureis*.

Tab. 15. f. 3.

Caput rugosulum. *Labrum* albidum. *Mandibulæ* ad basin

albæ, ad apicem nigræ. *Palpi maxillares* articulis primis albis; ultimo brunneo, *labiales* tribus * primis albis, tertio albidé hirsuto. *Thorax* punctis impressus, lateribus pilis albis aspersis. *Abdomen* metallice nitidum, lateribus subtus pilis albis aspersis. *Pedes* metallici albidé hirsuti.

Long. corp. $\frac{6}{10}$.

Habitat. in Barbariâ.

In Must. nost.

In the markings of the *elytra* this insect approaches the *C. chitoleuca*, Dej. very closely. Independently however of that insect being a Russian species, the present exhibits a marked distinction in the colour of the *antennæ* and *tibiæ*, which I have particularized in the specifick description. I have observed the insect only in the collection before alluded to, which was formed by Captain Lyon in his travels into Barbary : and I have named it in honour of that intrepid officer, whose spirit of enterprize has led him into the most unpropitious quarters of the globe, from the burning sands of Africa to the frozen shores of the Arctick regions.

Trib. LAMELLICORNES. Lat.

Stirps. PETALOCERA THALEROPHAGA. Mac L.

Fam. CETONIADÆ. Mac L.

Genus. GYMNETIS. Mac L.

UNDULATA. *G. atra*, thorace brunneo, vittâ marginali irregulari, mediâque rectâ, albis; *elytris* brunneis albo-marginatis, quatuor fasciis mediis undulatis subinterruptis albis.

Tab. 15. f. 4.

Clypeus ater, maculis quatuor albis. *Antennæ*, pedesque nigri. *Thorax* vittâ marginali anticé appendiculatâ, appendice recurvo clavato. *Scapulae* et *elytrorum* macula humeralis albæ. *Abdomen* nigrum, segmentis ad latera albo-marginatis. *Anus* maculis tribus albis, mediâ minimâ.

Long. corp. $\frac{23}{30}$.

Habitat in Braziliâ.

In Mus. nost.

* The only specimen I have seen of this insect has lost the last joint of the labial palpi.

I found a single specimen of this insect in a very extensive collection, sent to this country some time since from Rio Janeiro. It is particularly distinguished by the singular and brilliant puce or claret-brown colour of the *thorax* and *elytra*. I have since observed a species in some abundance in a collection, formed by my friend Mr. Such, in the neighbourhood of the same place, which closely resembles it, differing only in the colour of the *thorax* and *elytra*, which are black. I have some doubt whether my insect may not be a mere variety of the latter.

I perceive that Count Hoffmannsegg, in Wiedemann's Zoological Magazine, I. i. 5. 15, has given the name of *Macronota* to the genus *Gymnetis* of the "Horæ Entomologicæ." The latter name must of course hold good, inasmuch as it was published long before the other.

HIEROGLYPHICA. *G. atra*, clypeo thorace elytrisq̃ue glabris, ochraceis, strigis interruptis nigris.

Tab. 15. f. 5.

Clypeus apice nigro, strigâ mediâ longitudinali nigrâ. *Thorax* strigis undecim nigris, mediâ longitudinali, cæteris obliquis, quatuor mediis angulariter confluentibus. *Elytra* strigis plurimis nigris, humeralibus et apicalibus obliquis, mediis transversis, omnibus in maculam mediam suturalem spectantibus.

Long. corp. $\frac{5}{6}$.

Habitat in Brazilîâ.

In Mus. nost.

Fam. RUTELIDÆ. Mac L.

Gen. MACRASPI. Mac L.

CLAVATA, Fab. *M. olivaceo-ænea*, nitida, glaberrima, clytris pallidé aurantiis, striis longitudinalibus obsoletis.

Tab. 15. f. 6.

Cetonia clavata, Fab. Syst. Eleuth. 1. 151. 81.

————— Oliv. Ins. 1. 6. 72. tab. 8. fig. 68.

Caput, *thorax*, et *scutellum* glaberrimi, olivaceo-ænei. *Antennæ* nigræ. *Pedes* et *abdomen* olivaceo-ænei, punctis impressi.

Long. corp. $1\frac{1}{12}$.

Habitat in Brazilîâ.

In Mus. Dom. Mac Leay, Such, nost.

From the bright colouring of the insect represented in the accompanying plate, I was induced to consider it a different species from that figured by Olivier, and I was farther led into this opinion in consequence of the bad representation of the structure of the insect in his figure. I have lately however observed several specimens in Mr. Such's Brazilian collection in which both the bright and the dark colour is discernible: and I am informed by that gentleman, that the living insect is invariably light coloured; that when allowed to die a natural death its *elytra* assume a brownish or dusky tint, but when immediately killed after its capture it retains its original brightness. I am indebted for a fine series of this insect, as well as for many other valuable Brazilian species, to the liberality of that gentleman, whose researches in the Brazils have added considerably to our resources both in Ornithology and Entomology; and from whose zeal, and love of science, we may expect much interesting information hereafter from the same quarter.

Genus. RUTELA. Lat.

NITESCENS. *R. atra, pedibus, antennis, clypei apice, thoracis marginibus lateralibus, elytrorumque strigis sulcatorum nitidè rufis.*

Tab. 15. f. 7.

Labrum, palpi, mentumque rufi. Mandibulæ rufæ, apice nigro. Clypeus punctis minimis aspersus. Thorax glaber, fortiter marginatus, puncto utrinque impresso. Scutellum rufum. Elytra longitudinaliter profundè sulcata. Abdomen nigrum, segmento ultimo rufo. Sternum rufum. Pedes metallicè rufi.

Habitat in Breziliâ.

In Mus. nost.

Trib. CAPRICORNES. Lat.

Genus. LAMIA. Fab.

VNOTATA. *L. griseo-brunnea, thorace maculis duobus brunneis, clytris maculâ humerali subtriangulari brunneâ albo-marginatâ, fasciâque apicali anticè rotundatâ brunneâ strigâ irregulari ornatâ.*

Tab. 15. f. 8.

Caput, corpus, clytra, et pedes pilis confertis operti. Elytra

scabrosa, fasciæ apicalis figurâ albâ literæ V persimili pilis albidis prominentibus compositâ. *Pectus* brunneum, lateribus strigâ albâ pilosâ longitudinali distinctis.

Long. corp. $\frac{2}{3}$.

Habitat in Brazilîâ.

In Mus. nost.

This and the following species appear to belong to the extensive group which forms the genus *Acanthocinus*, Meg. But as the characters of that genus, together with those of many of the new continental genera have hitherto been unpublished, I refrain from referring these insects to any group with which I cannot be certain that they accord. For the present I shall leave them in the comprehensive genus *Lamia*, until a complete revision is made of the *Capricorn* Insects.

PERPULCHRA. *L. griseo-brunnea, elytris maculâ humerali brunneâ, fasciâque apicali latâ, obliquâ, apice pallidiore.*

Tab. 15. f. 9.

Caput, corpus, [elytra, pedesque pilis confertis operti. Elytra scabrosa, fasciâ apicali triangulari anticé albo-marginatâ. Pectoris latera strigâ albâ pilosâ irregulari distincta.

Long. corp. $\frac{2}{3}$.

Habitat in Brazilîâ.

In Mus. nost.

[To be continued.]

ART. LII. *Proceedings of Learned Societies on subjects connected with Zoology.*

ZOOLOGICAL CLUB OF THE LINNEAN SOCIETY.

May 11, 1824.—A paper was read by N. A. Vigors, Esq. M.A. F.L.S., containing Observations “On the Nomenclature of Ornithology,” and a discussion took place on the subject.

May 25.—A paper was read by J. E. Bicheno, Esq. F.L.S.

“ On the quinary arrangement of Nature,” and the subject subsequently underwent a lengthened discussion.

Some observations were introduced before the meeting by W. Burchell, Esq. F.L.S. on the genera *Pagonias*, Ill. and *Bacco*, Auct. as forming the connecting link between the Linnean genera *Psittacus* and *Picus*. That gentleman stated that his inferences were drawn from personal observations during his Travels in Southern Africa.

The *crania* of three quadrupeds from New Holland were exhibited by Joshua Brookes, Esq. F.R. and L.S. two of which were ascertained to belong to the genus *Dasyurus*, Geoff. On the animal of the third, he requested information, and the subject was referred to the Assistant Secretary.

June 8.—Mr. Bennett recalled the attention of the Club to the *Crania* exhibited by Mr. Brookes at the last Meeting; and stated that the specimens relative to which that gentleman requested information, corresponded with specimens contained in the Museum of the College of Surgeons, and to which the name of *Dasyurus ursinus* had been prefixed by Professor Temminck. As the *Cranium*, however, before the Club, differed remarkably in the number of the Molar teeth from that of the *D. ursinus*, as described by Mr. Harris, in the ninth volume of the Transactions of the Linnean Society, Mr. Bennett felt some doubt as to its being referable to that species. The other *Crania*, exhibited by Mr. Brookes, were described as belonging to *Dasyurus macrourus* and *D. cynocephalus*; and it was remarkable that the description of this latter animal also, as given by Mr. Harris in the same paper, did not coincide with the specimen exhibited in respect to the number of the molar teeth.

A portion of a paper “ On Tunicata, with a description of three new species,” by W. S. MacLeay, Esq. M.A. F.L.S. was read by the authour.

June 22.—The Secretary exhibited two specimens of *Dromia Mediterranea*, Leach, which were communicated to him by Mr. J. E. Gray, for the information of the Club. These specimens were found in Billingsgate market, by that gentleman,

among some Oysters, which were stated to have come from Whitstable Bay, on the Essex coast.

The remaining portion of M. Latreille's paper, "On the Insects figured and sculptured on the Ancient Monuments of Egypt," translated by Mr. Bennett, was read.

July 13.—The Secretary exhibited specimens of several new species of *Cypræa*, from the Cabinet of Mr. J. E. Gray, which had been lately figured and described in the Zoological Journal. In one of these, the *C. nivea*, there appeared a singular deviation from the colouring of the other *Cyprææ*, in its being perfectly free from those bands, which appear in greater or less number upon the whole of the species hitherto described. A series of *Patella cærulea* and *P. pellucida* was also exhibited, which identified them as one species, differing in form, opacity, and colour, according to the nature of the surface, whether flat or rounded, to which the shell is attached: as also a specimen illustrative of the same fact, being an union of the *Patella compressa* and *P. miniata*; an anomaly, which had been observed by Lamarck with considerable surprise. The present specimen exhibited at its apex the form of *P. miniata*, in the middle that of *P. compressa*, and at its base it reassumed the character of *P. miniata*.

A portion of a paper "On the Flight of Insects," by J. Chabrier, translated by Mr. Bennett, was read.

July 27.—The Rev. Mr. Kirby, F.R. and L.S. exhibited specimens of the following new insects, referred to in the "Introduction to Entomology," viz. *Hexagonia terminata*, *Onthophagus cervicornis*, *Onthophagus aries*, *Mimela nigricans*, *Gnathocera immaculata*. The same gentleman also exhibited two specimens of *Stylops Melittæ*, one of which was taken in the spring of the present year; and the other was the specimen originally described in the Linnean Transactions.

A continuation of M. Chabrier's paper "On the Flight of Insects," was read by Mr. Bennett.

August 10.—Mr. Bennett exhibited a fragment of rock from the coast of the county of Clare, in Ireland, in various cavities

on the surface of which were lodged specimens of an *Echinus*. He also read extracts from a letter on the subject, from Mr. John D. Humphreys, of Cork, from whom he received the specimen; and he promised to furnish the Club with a detailed account at a future Meeting.

A portion of a paper was read, entitled "A description of such genera and species of Insects, alluded to in the Introduction to Entomology of Messrs. Kirby and Spence, as appear not to have been sufficiently noticed or described," by the Rev. William Kirby, M.A. F.R. and L.S. &c.

August 24.—The remaining portion of Mr. Kirby's First Decade of Insects, commenced at the last Meeting, was read.

ROYAL ACADEMY OF SCIENCES OF PARIS.

March 1, 1824.—M. Cuvier read a Memoir, entitled, *A New Examination of a Fossil Animal, from the Schists of Solenhoffen, which appears to belong to the class of Reptiles, and to which the name of Plerodactylus has been given.*

March 8.—M. Moreau de Jonnès read some *New Researches upon the Trigonocephalus lanceolatus, (T. fer de lance) or Great Viper of the West Indies*; and on

March 15, He exhibited the young of that reptile, as ready for birth.—M. G. Saint-Hilaire read a Memoir, *On the Osseous System, as affording the most certain indications of Affinities in Zoology; and on the presumable causes of this superiority of evidence.*

March 22.—M. Magendie communicated the result of his experiments on the sense of smell. He announced that this sense is not entirely destroyed by the division of the olfactory nerve; and he also described the various effects produced by the division of the fifth pair of nerves.

March 29.—M. Foulhoux read a Memoir, entitled, *Anatomical and Physiological Remarks on the Ganglionic System.*

April 5.—M. Cuvier read a Memoir, *On a new genus of Fossil*

Reptiles, discovered in England some years since, and named Ichthyosaurus.

April 12.—M. Magendie communicated an observation which he had recently made on the effects of the rupture of the great commissure of the cerebellum, above the passage of the fifth pair. The animal subjected to this experiment fell down on the side on which the nervous tissue was divided, and the motions of its eyes lost their mutual agreement.——M. Bosc made a verbal report relative to a Notice, by M. Fischer of Moscow, on an Insect known in Persia by the name of *Mianah*.

April 19.—M. Bailly read a Memoir, entitled, *Researches upon the Anatomy of the Brain of the Mole*.

April 26.—M. Gaillardot transmitted a Memoir, *On the Fossil Bones of the environs of Lunèville*; and M. Rolando, of Turin, his *Anatomical Researches on the Spinal Marrow*.——M. Bory de St. Vincent communicated his observations on the Spermatic Animalcula, for which he proposed the generic name of *Zoospermes*.

May 3.—M. G. St. Hilaire read a new Memoir *On the Nutrition of the Marsupialia*. ——M. Bailly read a Memoir, entitled, *A Description of the filaments by means of which the Lophius seizes Fish*: M. Geoffroy made some remarks on the same subject, and reminded the Academy that the Lophius also catches fish by artifice.

May 10.—M. Cuvier made a verbal report on several Memoirs, which had been presented in manuscript, but which had since been printed by their respective authors. These were the Memoirs by M. Flourens, *On the Functions of the different parts of the Nervous System*; those of M. Desmoulins, *On the Anatomical Relations of that System*; and lastly, a Memoir by M. Bailly, entitled, *A Treatise on the Comparative Anatomy and Physiology of the Nervous System, in the four classes of Vertebrated Animals*.

May 17.—M. G. St. Hilaire communicated a report on the Memoir of M. Bailly, concerning the Lophius. He commenced by shewing, that Aristotle was acquainted with the habits of this

animal. In the works of that Prince of Naturalists, is the following passage: "There is a species of Frog, which is called *The Fisher*. It derives this name from the wonderful industry which it displays in procuring its nourishment: for in the front of its eyes it has certain appendages which it extends like hairs, and which, dilated at the extremity, form double baits which it carries. After having stirred up the mud or the sand, it conceals itself, and elevates these appendages; the little fishes coming to seize them, it draws them into its mouth." "The *Lophius* fishes with the line," says Plutarch; "for it throws out from its neck a filament which it extends to a distance, in the manner of a line, letting it out and drawing it in at pleasure. This being done, when it perceives some little fishes about it, it allows them to bite the extremity of this filament, being itself concealed beneath the sand, or in the mud—when it gradually retracts that member until the fish is near enough to be swallowed by a quick motion."

It is these *filets pêcheurs*, as the author denominates them, which have formed the subject of his researches; he determines their nature, and describes their general support. M. Bailly says, that the third filament is articulated immediately with the occipital integument: the Reporter thinks that this is not the case, and details his objections. The description of the muscles which serve for the various motions of the filaments is very satisfactory, and shows that the Ancients were not deceived with regard to the uses for which these appendages are destined.

So voracious an animal as the *Lophius*, however, cannot obtain, by fishing alone, sufficient to supply its wants. M. Geoffroy describes the other habits of this singular fish, and concludes by recommending the insertion of M. Bailly's Memoir in the *Recueil des Savans étrangers*, published by the Academy.

May 24.—M. d'Hombre Firmas, Mayor of Alais, transmitted to the Academy a Memoir, containing Observations on Fossils, and in particular on Ammonites.—M. Geoffroy presented a Memoir on the analogy existing between the *filets pêcheurs* of the *Lophius*, and the ascending apophyses of the vertebrata, especially with the first rays of the dorsal fin of the Siluri.—M. Audoin communicated

one of the observations contained in his work on the generation of articulated animals ; it related to the use of a vesicle which accompanies the female organs of generation in insects.

May 31.—M. Magendie stated that he was proceeding with his experiments on the fifth pair of nerves.——M. Desmoulins read a Memoir on the differences between the nervous system of the Lamprey, and that of the other Vertebrata, with regard, 1st. to physical properties ; 2ndly, to the number of parts ; and 3rdly, to the mode of union of those parts.

June 7.—This day the annual public meeting of the Academy was held, when the Physiological Prize, founded by M. de Monthion, was divided between M. M. Flourens, Prévost, and Dumas. M. Strauss, author of a work on the Anatomy of the Cockchaffer, also obtained a medal ; and M. Gaspard honourable mention.

June 14.—M. M. Cuvier and Latreille made a report on a Memoir, by M. Léon Dufour, entitled, *A Collection of Observations on the Anatomy of the Coleoptera.*——M. Cuvier read a Memoir *On the Plesiosaurus*——M. G. St. Hilaire read a Memoir *On the Auditory Faculties of Fishes.*

July 12.—M. G. St. Hilaire made a verbal report on a work by M. Serres, entitled, *The Comparative Anatomy of the Brain, in the four classes of Vertebrated Animals.*

July 26.—M. Latreille read a note accompanying a drawing of a new genus of Spiders, which he has named *Myrmecia.*——M. M. Bosc and Latreille read a report on a Memoir by M. Guyon, on a species of Leech, found in the eye-lids and nasal fossa of the *Ardea virescens* of Linnæus, at Martinique.

August 2.—It was announced that the bones of a Mastodon, of great size, had been found in a gravel-pit at Montpellier.——M. G. St. Hilaire made some observations on the fossil discovered at Moret, and said to belong to the human species. He considered this opinion to be void of foundation.——M. Desmoulins read a Memoir *On the lachrymal organ, and nervous system of the Trigonoccephali.*

August 9.—M. M. de Hermilly and St. Clair, proprietors of the fossil of Moret, announced that they would furnish M. Thenard

with specimens of it, for the purpose of analysis. M. M. Chevalier, Payen, and Julia-Fontanelle communicated some experiments which they had made on fragments taken from the surface of this fossil; from which it appeared that they contain from $\frac{17}{100000}$ to $\frac{14}{10000}$ of azotized matter, but no phosphate of lime.

August 16.—Dr. Lauth read a Memoir *On the Lymphatic Vessels of Birds*.——Some further observations by M. Gaillon were read, supplementary to his Memoir *On the Nutritive Animals of Oysters*.

ART. LIII. *Scientific Notices.*

NEW SPECIES OF PROCELLARIÆ.

In the 8th Number of the 3rd Volume of the “Journal of the Academy of Natural Sciences of Philadelphia,” an interesting account appears of four species of *Petrels*, which had until lately been confounded under the title of *Procellaria pelagica*, Linn. written by Mr. Charles Bonaparte. That gentleman gives descriptions of *P. pelagica*, Linn., *P. Leachii*, Temm., and *P. oceanica* Forst, and adds a description of a fourth species which he calls *P. Wilsonii*, that had been described and figured by the naturalist whose name it bears, under the name of *P. pelagica*, and referred to as such by European Ornithologists. The description of this newly characterized species is as follows:

P. Wilsonii, Bonaparte.

Tail nearly even, the *wings*, when closed, extending a little beyond its tip; length of the *tarsus* nearly one inch and a half, (sixteen French lines.)

SYNONYMES.

P. pelagica, WILSON's *American Ornithology*, Vol. VII. p. 90. pl. 60. fig. 6. And probably the *pelagica* of other authors, who have written on the subject of American Birds.

DESCRIPTION. General colour deep sooty black; *vent* each side, and *upper tail coverts* totally white; *primaries* and *tail* deep black; *greater wing coverts*, and some of the *secondaries*, tipped with whitish; *bill* five eighths of an inch long, black; *feet* black with a large, oblong, yellow spot on the membranes. Total length nearly seven inches.

SEXES alike in colour.

PROPAGATION. Breeds according to Wilson, in great numbers on the Bahama and the Bermuda Islands; and in some places on the coast of East Florida and Cuba. Like the bank swallows they breed in communities and make their nests in the holes and cavities of the rocks, above the sea. They are said to feed their young only at night, being during the day occupied in wandering over the ocean in quest of food."

Plates are annexed of this species, as also of *P. Leachii* and *pelagica*; from which and from the descriptions given of the four species, *P. Wilsonii* may be thus at once distinguished. Its *tail* which is nearly even, differs from that of *P. Leachii* which is forked, and those of *P. pelagica* and *oceanica* which are entirely even. In size it exceeds *P. Leachii* nearly one fourth, *P. oceanica* somewhat more, and *P. pelagica* at least one third. The length of the *tarsi* also in which it agrees with *P. oceanica*, exceeds that of the other two in a similar proportion. In the colour of the membrane which unites the toes, and which is black with a large oblong yellow spot, it differs from all the rest, where the same membrane is entirely black. And a striking difference is perceptible in the structure of the bill, the tube in which the nostrils are united being slightly curved upwards, and forming an angle with the *culmen* at a short distance from its *apex*, while in the other three species the same tube runs parallel with the *culmen*, and is united to the bill the whole way.

In their geographical distribution, *P. Wilsonii* appears confined to the western shores of the Atlantick, and *P. pelagica* to the European, while *P. Leachii* is common to both. *P. oceanica* is restricted to the shores of the Pacifick ocean. V.

BULLA HALIOTOIDEA, *Mont.*

The examination of a number of specimens of this shell with its animal, prove that it should be considered as a *Sigaretus*, according to Cuvier, (see his *Memoires pour servir à l'Histoire et à l'Anatomie des Mollusques*, published in the *Annales du Museum d'Histoire Naturelle*;) inasmuch as it accords exactly with his description and figures there given. It is well known that the shell has no canal at the base of the aperture; the most singular circumstance therefore, in this animal, is that a fold in the large membranous mantle, serves both the purposes of the shelly and of the membranous canal in the *Buccinidæ*, while in its general structure it otherwise resembles the animals of that family; the sexes being separate and distinguished easily by the male organ proceeding from the back of the neck. Of about twelve specimens that came under my examination at one time, two only were males. G. B. S.

ON THE GENERA SIGARETUS AND CRYPTOSTOMA.

Adanson in his *Voyage to Senegal* mentions by the name of *Sigaret*, a shell of which he had not seen the animal; Lamarck, however, having specimens of what he considered as the same shell, from the same place, and with the animal, sent them for examination to the celebrated Cuvier, who described the animal in the 31st number of the *Bulletin des Sciences*; whereupon Lamarck in his *Systeme*, formed it into a genus under the name of *Sigaretus*, referring to Cuvier for the description of the animal and to Adanson for that of the shell. It is, nevertheless, observable, that Cuvier in his *Memoirs on the Anatomy of Mollusca*, has described and figured under the same name an animal, which he received from the Isle of France, very different from that which he described before, and whose shell is also different from Adanson's *Sigaret*, being pellucid, and very nearly allied to *Bulla haliotoidea* of British Authors; whose animal *Montagu* considered as forming

one section of his genus *Laminaria*; (the other section of which is *Pleurobranchus* of Cuvier). Blainville, when in England described one of the Mollusca in the British Museum, which on his return to France he published in the *Bulletin des Sciences*, under the name of *Cryptostoma*, which is indeed a most singular animal; and upon examining the specimen I find that the shell very much resembles the *Sigaret* of Adanson, and that the animal is altogether different from that described by Cuvier and Lamarck. It therefore appears that Lamarck has taken his generic character of *Sigaretus* from the shell of one animal, and his description of the animal from that of a very different shell: and in his *Hist. Nat. des Anim. sans vert.*, he has described several species agreeing in generic characters with the shell. Two genera are evidently thus confounded; to avoid this we are placed in a peculiar dilemma, for if we keep *Sigaretus* for Cuvier's animal, and take *Cryptostoma* for the *Sigaretus* of Lamarck, we shall give the name *Sigaretus*, derived from the *Sigaret* of Adanson, to a very different shell, and we shall have to alter the names of all Lamarck's species: but in my opinion this would be better than forming a new name, (for *Laminaria* cannot be used, being already engaged by Lamouroux for a genus of marine plants.) Thus, my *Sigaretus* and that of Cuvier is the *Laminaria* of Montagu, *Helix perspicua* of Linneus, and *Bulla haliotoidea* of British Authors: and my *Cryptostoma* and that of Blainville, is the *Sigaretus* of Lamarck and Sowerby, the *Sigaret* of Adanson, and the *Helix haliotoidea* of Linneus. J. E. GRAY.

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ART. LIV. *Some Remarks on the Nomenclature of the Gryllina of MacLeay, &c. with the Characters of a new genus in that tribe. By the Rev. WILLIAM KIRBY, M.A. F.R. & L.S.*

THE Nomenclature of any Science, though not certainly of the *first* importance, ought not however to be neglected; for that adage of Linné is most true—*Nomina si nescis perit et cognitio rerum.*—While things are without names they are comparatively unknown; but as soon as a name is imposed, it imparts as it were a life and being to an object that it had not before. Yet, important as its Nomenclature to any Science confessedly is, how little, in general, has it been attended to! With the exception of Chemistry, in which a systematic plan has been adopted with admirable effect, almost every other science is at sea in this respect, at the mercy of the winds and waves; and the imposition of names, which ought to be regulated by fixed and acknowledged laws, is left to the fancy or crude conceptions of every individual. If we look only at Anatomy, a science so important to be made easy of comprehension, how perplexed and perplexing is its technical language, and how little of concinnity and harmony does it exhibit! All this has arisen from its having been constructed at different times by different persons, who had no common plan or system before them, to serve as a guide.

Linné, in his *Philosophia Botanica*, has given many excellent rules for the formation of the names of *genera*, but he constructed

no regular system of Nomenclature. He taught us, indeed, how to name properly the smaller branches and sprays of the tree of nature; but the larger branches were left to chance, and the caprice of scientific men. In Entomology, however, by giving a *uniform termination* to the names of his orders, he led the way to a more perfect system of Nomenclature, which his successors unfortunately neglected to improve. Latreille, indeed, to whose acumen and learning the science of Entomology is under such infinite obligations, in his efforts to trace out the Natural System of Insects, found it convenient to subdivide each order into various smaller sections, to most of which he has given appropriate names; but as he followed no general rule in the construction and application of these names, they serve rather to confuse than to inform the student, and to perplex rather than assist the memory; whereas, had the names of his *primary* subdivisions possessed the same termination, those of his *secondary* another, and so on till you arrived at the genera, the whole would have been a beautiful and harmonious system of Nomenclature, and a great help to the memory; and the nature of every section would have been comprehended in an instant.

I suggested some time ago a plan of this kind, and the adoption of patronymic names of the same termination (*Linn. Trans.* xi. 88, note)—a plan which Mr. W. S. MacLeay, in his learned *Horæ Entomologicæ* has adopted and improved upon, by distinguishing the primary sections of several of his Orders by terminating the name of each in *ina*. If this principle could be applied to all the Divisions till you arrive at genera, it would give a vast clearness to the science—other names might terminate in *ita*—another set derived from parts of the economy of insects in *phila*; and a third, from their food, in *phaga*, or in *myza* perhaps, if they belonged to the *suctorious* tribes.

It is not my intention to pursue this idea further, but I have been led into it by observing what havoc and confusion have been made in the Linnean genus *Gryllus*, (*Gryllina*, MacL.) by scientific men taking their own fancy as their guide, without regard either to justice or propriety.

Linné divided this great tribe into five subgenera; namely—

Acrida, *Bulla*, *Acheta*, *Tettigonia*, and *Locusta*. Of these all, except the second (*Bulla*), represented *natural* sections of the tribe. When Fabricius undertook the new modelling of this tribe according to his own system, he discarded three of Linné's names, turning *Acrida* into *Truxalis*, which seems a mistake for *Troxalis* (τρωξάλις); *Bulla* into *Acrydium*, from Geoffroy, restricting the name very properly to those minute *Grylli* whose prothorax terminates behind in a long process that covers the abdomen; retaining *Acheta* for the Crickets; very properly rejecting *Tettigonia*, a Greek diminutive, signifying a small *Tettix* or *Cicada*, but in its room, unhappily following Geoffroy in giving the name of *Locusta* to those Grasshoppers whose females are distinguished by an ensiform ovipositor, and taking it away from the true Locusts, to which he gave the name of *Gryllus*, properly belonging to the Cricket.

Under *Bulla*, Linné had included not only those Cape insects resembling a bladder (*Pneumora*, Thunb.), which the name suited, but some of his own *Locustæ*, and the *Acrydia* of Fabricius. Latreille has not been so happy as to succeed in his endeavours to amend Fabricius's nomenclature. With great propriety, however, he restored to the Cricket its ancient Latin name *Gryllus*, and separated from it *Gryllotalpa* and *Tridactylus*; but led astray by the Gallic passion to uphold names imposed by a French author, *per fas atque nefas*, he has retained Geoffroy's name of *Acridium*; thus absurdly expressing, by a diminutive signifying a *little* Locust, that far-famed and wide-ravaging plague, the terror of half the regions of the earth, the *great* Locust. As Geoffroy included the *Acridium* of Fabricius in his genus, it would with much more propriety have been restricted to that minute animal: *Tetrix*, by which M. Latreille has distinguished it, appears to be a corruption of the Greek *Tettix*, or the *Cicada*, and therefore is equally improper with *Tettigonia* for one of the *Gryllina*. I think, on these accounts, that Dr. Leach has done a great service to the science by restoring the name of *Locusta* to the real locust of the ancients; but that of *Conocephalus*, by which, after Thunberg, he would designate the *Locusta* of Geoffroy and Fabricius, seems less proper. It is very well when applied to those

with a *conical* head, but those with an *obtuse* one should not be so called. In fact, this tribe includes several genera or subgenera. Our most common species, with an *obtuse* head and *straight* ovipositor (*Locusta viridissima*, F.), with its affinities, I would call *Acrida*, and leave *Conocephalus* for those with a *conical* head. Those whose *elytra*, or rather *tegmina*, so beautifully imitate the leaves of plants, distinguished by a *recurved* ovipositor, I would call *Pterophylla*. I possess an undescribed genus, which connects the tribe in question with the *Locustidæ* (*Gryllus*, F.), of which I will here give a description.

GENUS. SCAPHURA.

Antennæ, basi filiformes, apice setaceæ.

Ovipositor, brevis, cymbiformis, punctis elevatis acutis scaber.

VIGORSII. *Sc. atra*, abdomine cærulescente, femoribus posticis, fasciâ mediâ albidâ, elytris apice pallescentibus.

Long. Corp. Lin: 14.

Habitat in Brasiliâ. D. Hancock.*

Before I conclude I wish to say a word on the Nomenclature of the tribe of insects to which Fabricius has transferred Linné's name of *Tettigonia*, before discussed. This tribe was by the Greek writers called *Tettix*, and by the Latins *Cicada*. M. Latreille has exchanged, and perhaps not improperly, Fabricius's name, which means strictly a diminutive *Tettix*, for the latter. As there appear to me at least *three* types of this tribe, these three names may be retained. Those, the lateral margin of whose prothorax is *rounded*, to which section *C. Orni*, probably Virgil's *Cicada*, belongs, might retain the name *Cicada*; those the sides of whose prothorax are *dilated* and *angular*, as *Tettigonia limbata*, might be denominated *Tettix*; and those small ones, the sides of whose prothorax are *deflexed* and have no margin, as *T. sanguinolenta*, might very properly inherit the much bandied name of *Tettigonia*.

Barham, Nov. 30, 1824.

* Mr. Kirby has kindly promised to communicate a more detailed description of *Scaphura Vigorsii* hereafter.—ED.

ART. LV. *An Account of the unexampled devastations committed by Field-Mice in the Forest of Dean in Gloucestershire, and in the New Forest in Hampshire, during the years 1813 and 1814. In a letter to the late Right Hon. SIR JOSEPH BANKS, Bart. P.R.S., from the late Rt. Hon. SYLVESTER DOUGLAS, LORD GLENBERVIE.**

Whitehall Place, 30th June, 1814.

DEAR SIR,

THE great devastation committed during the course of the last and the present year, in our young plantations in Dean and New Forests, by an unexampled number of Mice, which have overspread those forests during that period, having been the subject of repeated communications with which I have troubled you, I flatter myself that it will not be uninteresting to you, to see collected together all the material facts and circumstances which I have been able to obtain either from personal observation or the information of others concerning this new plague; I call it *new*, because, although the destruction of acorns by that vermin has been always known, and mentioned by every writer treating upon such subjects, from the earliest time, yet I have not found in any author, from Theophrastus and Pliny downwards to Evelyn and the more modern writers of our days, the smallest hint of the mischief of which I myself have been a witness to a most alarming extent, which those pernicious little animals have done in our plantations by devouring the bark of the young plants, all round from the ground to the height of about six inches, and in many instances gnawing the root itself through and through.

The whole, both of Dean and New Forests, appears to be numerously stocked with Mice, at least wherever the large furze-brakes in the open parts have been burnt, their holes and runs are perceived to cover the whole surface. This was particularly the case over a district called Haywood Hill in Dean Forest, and which now forms one of the new plantations in that forest, containing about 500 acres.

* Communicated by William Elford Leach, M.D. F.R.S. F.L.S. &c.

In the autumn of 1810, Haywood inclosure was first completed so as to exclude all the commonable cattle, and the few Deer still remaining in that forest, and was then planted with acorns. In the spring following, plants from about one third of those acorns came up, the remainder it is probable were destroyed principally by Mice. The natural hollies which it had been necessary to cut down in order to give room for planting the acorns, had made young shoots, but no attack was made upon them in the winter of 1811. The runs of the Mice however appeared very numerous. In the autumn of 1812, a large quantity of five years old oaks and chesnuts, with some other forest trees, as ash, larch, and fir, were planted at regular distances in the same inclosure. In the winter of that year, the first symptoms of the devastation by the barking of the plants were perceived by the woodman in the shoots of the hollies that were now got to the height of two, three, or more feet, great numbers of them being barked round at the ground for four or five inches upwards, and in consequence dead or dying. This soon became almost universal over the whole of that inclosure. In the spring following (1813) a number of five years old oaks and chesnuts were found dead, and on being pulled up, it appeared that the roots had been gnawed through two or three inches below the surface; many were also barked round and killed in the same manner as the holly shoots, and a great number begun upon, and consequently become sickly, though not as yet entirely killed. The evil was observed about the same time to have extended itself to some of the other inclosures.

The first notice *I* received of this misfortune was by a letter from the Deputy Surveyor of Dean Forest to our Secretary in the Department of Woods, dated 14th May, 1813, and *I* cannot give a more lively impression of the serious alarm excited by the evil, than by transcribing the words of that letter.

“ *I* am very much alarmed at the danger likely to arise to the plantations from the Field Mice, particularly in Haywood and Crabtree Hill Inclosures. The woodmen in both have found five years old oak and chesnut plants, in various places barked round at the bottom, and consequently dead; but their principal devastation at present is confined to the young shoots from the

hollies that had been cut down, which they have barked so universally as to destroy them entirely on about fifty acres of Haywood inclosure, which are now looking brown and withered, as if they had been nipped by the frost ; and I fear that when there are no hollies left (and it seems to me that they will very soon destroy them totally) the young trees will suffer more considerably.

“ As I am quite at a loss as to the method of extirpating them in such situations, I will thank you to inform me, whether you have any information which is likely to be useful in this case, contained in the different answers to the queries proposed by Lord Glenbervie on this subject, and that you will communicate it to me. The land, as you know, is covered with long grass, fern, &c. under which those Mice have runs or roads, and they are seldom seen above ground. They are the short-tailed reddish-coloured Field Mice.”

On receiving that letter, I was under the necessity of acquainting Mr. Davies, the Deputy Surveyor, (whose name I am happy in an opportunity of mentioning, in order to bear testimony to his skill, diligence, and integrity, in an office in which those qualities are peculiarly requisite) that the source to which he referred, afforded no such information as he expected. Having however heard about this time of the success of the method of Mr. Benjamin Broad, of Herefordshire, in the destruction of Rats and Mice, I desired that Mr. Davies would correspond with him on the subject, and if he saw any reasonable prospect of advantage in employing the means he recommended for the destruction of Field Mice, to engage him to go over to Dean Forest, and make a trial of his process under his own superintendence and direction. This was accordingly done. Mr. Broad went to Dean Forest, and after trying his peculiar baits for three days in Haywood Inclosure, which was the most infested, without any success, he gave up the attempt as hopeless, ascribing the failure to the different nature of the food of these Mice, from that of those he had been accustomed to deal with, which appear to have been the common house Mice.

In the beginning of September, 1813, I had myself an opportunity of personally observing in Dean Forest, and in a week

afterwards in New Forest, the mischief done and to be apprehended from these vermin, and I ordered every means that occurred either to myself or others, to be used for their destruction.

1. The first and most obvious was to procure a number of Cats to be turned out in the inclosures, and sixteen having been brought to the woodman's cottage in Haywood, the old ones being let loose, killed a great number, and travelled to a considerable distance, but there was reason to fear that a fair trial could not then be made of that remedy, for there were no means of confining them to any particular spots, and as soon as the digging of holes or trenches (as I shall afterwards state), was adopted, they became nearly useless, as they satisfied themselves with the Mice that were caught in them without hunting for others.

2. Another expedient has been to clear away the bushes, furze, fern, rough grass, &c. and so expose the Mice to the stronger vermin and birds of prey, but this was also soon abandoned on account of the great expense incurred, in order to keep down that natural cover.

3. A great variety of poisons have been tried, mixed up into a kind of paste, with grease, flour, &c. viz. arsenic, nux vomica, ratsbane, corrosive sublimate, ground glass, &c. The Mice appear to have eaten of them all, but we have no means of judging of the effect, as none of them were found dead, except in the holes. In one inclosure, consisting of forty acres, where those poisons had been tried, nearly 2,000 Mice were soon afterwards caught, which seems to prove, that the poisons employed had not been very effectual. Nux vomica was the most so.

4. Seven or eight different sorts of traps were set in the places most infested. Those combined with small pitfalls were found to answer best. They consisted of a box sunk in the ground, with the top level with the surface. This top had a pin passing through the centre which turned on a pivot, upon which it was put into the box, and when the Mouse came in pursuit of the bait, he was precipitated into the box below, and the top returned to its former station; wooden traps of this description were used at first with some success, but the moisture of the ground making them swell,

and preventing their working, tin ones of the same sort were substituted and answered very well, catching great numbers. They were however superseded by the trenches or holes, which were cheaper and succeeded better.

5. The plan of the holes which has answered so well, was first suggested by a man of the name of Simmonds, a professed Rat-catcher, who having been employed to catch the Mice, had observed, on going to work in the morning, that some of them had fallen into wells, or pits, accidentally formed, and could not get out again; many of them dying from hunger or fatigue in endeavouring to climb up the sides. Such pits were therefore on his recommendation immediately tried. They were at first made three feet deep, three long, and two wide; but these were found to be unnecessarily large, and, after various experiments, it appeared that they answered best when from eighteen to twenty inches deep at the bottom, about two feet in length, and one foot and a half in width, and, at top, only eighteen inches long and nine wide, or indeed as small as the earth could be got out of a hole of that depth; for the wider they are below, and the narrower above, the better they answer their purpose. They were made twenty yards asunder, or about twelve on an acre; or, when the Mice were less numerous, thirty yards apart.

Nearly 30,000 Mice had been caught, principally by this last method, in Dean Forest, up to the 22d of December last, and Mr. Davies is convinced that a far greater number have been taken out of the holes, either alive or dead, by Stoats, Weazels, Kites, Owls, &c. and even by Crows, Magpies, Jays, &c. The success of these holes in Dean Forest, has been so great, that the use of a bait in them was soon discontinued; but, from an inaccuracy in the digging of them, or some other cause, they have been far less efficacious in New Forest, where the Mice continue still, though less numerous now, to infest our plantations.

It was hoped, that the late severe weather would have either totally destroyed, or greatly diminished the numbers of these animals, for they did not venture out during the hard frosts. In a letter from Mr. Davies, dated the 8th of March, 1814, he gives only 1,216 as the number taken from 7th January to the 5th

March, and he says, the whole of these had been caught in a few days of open weather which intervened about that time.

The total numbers caught in Dean Forest to the 8th March, 1814, did not much exceed 30,000, and in New Forest, only about 11,500 had been taken, up to the same period.

On enquiring whether the Mice had ever actually been seen in the act of barking the young trees, by any of the woodmen or labourers, or, if not, what reasons there were for concluding with certainty that *they* were the depredators, I found that Simmonds, the Ratcatcher before mentioned, and Hobbes, one of the woodmen, have asserted, that they have *seen* them gnawing the bark at the height of three and four feet, to which distance they had climbed from the ground. Besides this direct evidence, that the mischief was done by Mice, and not by other animals, as Hares, Rabbits, &c. (of the former of which, there are very few in either of the Forests, and of the latter, none in either); the gradual decrease of the evil where great numbers of Mice have been destroyed,—its total cessation in the parts first holed;—the same dung found in the holes where they have been caught as was observed, in numberless instances, near the trees barked;—their being taken in the very runs close to which trees have been found eaten through the roots;—and, when some young shoots of oak and holly have been cut and thrown into the pits, their having begun to gnaw the bark immediately;—all these circumstances taken together, amount in a manner to demonstration. The last-mentioned experiment has been frequently repeated.

In both Forests, two sorts of Mice have been observed, one the short tailed, the other the long tailed *Field Mouse*. The former (by far the most numerous, but particularly so in Dean Forest, being there in the proportion of upwards of fifty to one long-tailed) seems to be the *Campagnol* of Buffon, and Pennant gives that as the French for his *Meadow Mouse*. The long tailed appears to be Buffon's *Mulot*, which name Pennant gives as the French for his own *Field Mouse*. *Campagnol* is the only species of short tailed Mouse mentioned by Buffon, who says, he was the first who applied that name to it in French, having adopted it from the Italian, *Campagnolo* (which word however in Italian, corres-

ponds generally to Field Mouse, or *Souris des champs*); one of its names formerly in most common use in France, appearing from him to have been *Mulôt à courte queue*, while the true *Mulot* in some places is called, *Le Rat à la grande queue*, *Mus caudâ longissimâ*. It is only in this incidental way, by mentioning the different appellations of this last animal, that Buffon takes notice of the length of its tail. There is indeed considerable inaccuracy and confusion in the accounts given by different authors of the various species of Rats and Mice, of which thirty-four are enumerated by Buffon, (or rather by his Posthumous Editor). Buffon thinks several writers have fallen into a mistake in subdividing the species called *Mulot* into two, partly from their observing very great differences in the size of different individuals of that species, and partly from their taking the *Mus domesticus medius* of Ray to be a distinct species of the *Mulot*, but which, though shortly and inaccurately described by Ray, and seemingly from the account of others, not ocular inspection, Buffon supposes to be only a *Mulot* not grown to its full size. Though the word *domesticus* is not applicable to it, Pennant gives that among the appellations of his *Field Mouse*. Buffon says, the *Mulot* appears to be a long time in coming to its full growth, and that, when it does, it is four inches and two or three lines, or twelfth parts of an inch long, from the tip of the nose to the root of the tail; that the smallest are an inch shorter; and, that they are found of all the intermediate sizes. He seems to consider the *Mulot* in general, as a more powerful animal than the *Campagnol* or short-tailed Mouse; for he says, the latter is scarcely more than three inches long from the nose to the tail; and mentions that the *Mulots* when they fall short of food in winter, not only devour the smallest of their own species, but also the *Campagnols*, whereas, speaking of the manner of feeding of the latter, though he says, they eat one another in times when their more natural food is scarce, he immediately adds, that they serve also for food to the *Mulots*, &c. without mentioning that they ever eat the *Mulots*. But, on the contrary, in Dean Forest, the *short-tailed large-headed Mouse*, is considered as the more powerful animal,

and when full grown, is considerably larger than the *long-tailed Mouse*; and Pennant describes his *Field Mouse* as measuring, from the end of the nose, to the setting on of the tail, only four inches and a half, and the tail as four inches long, while he states the length of his *Meadow Mouse* to be, from the nose end to the tail, about six inches, and that of its tail only an inch and a half. We have not yet been able to prove, by actual experiment, or observation, that the long-tailed Mice bark the trees, though it is believed, in both Forests, that they do. Both Buffon and Pennant describe both sorts as burrowing underground. Buffon says the *Campagnol* is found in a greater variety of situations than the *Mulot*; that the *Mulot* chiefly frequents high dry ground, woods and neighbouring fields; the *Campagnol* not only woods and adjoining fields, but also meadows and gardens. According to Pennant, though the *short-tailed Mouse*, in its manners, and general food, much resembles the *Mulot*, it differs from it in the places of its abode, and seldom infests gardens. In Dean Forest the few *long-tailed Mice* that have been taken, were on the wet greens, and never on dry ground; the *short-tailed* equally infested the wet and dry ground. According to Buffon, the *Mulot* establishes himself in holes which he finds already made, or which he forms for himself, under bushes or in the trunks of trees; that he there amasses a prodigious quantity of acorns, nuts, or beechmast; that a bushel has sometimes been found in one of their holes; and, that they collect this provision, not in proportion to their wants, but to the dimensions of the hole; that those holes are ordinarily a foot underground, and often divided into two chambers, one of which they inhabit with their young, and use the other as their magazine. Similar hoards of acorns, nuts, &c. have occasionally been found in both our Forests; but no divisions have been observed in their holes in either. Buffon furnishes us with a probable explanation of the cause of the failure during the last several years of our *planted* acorns. He says, "I have often experienced the injury which these animals (*Mulots*) occasion to plantations, they carry off the acorns newly sown, following the line of the furrow traced by the plough, and digging

up one acorn after the other, without leaving one. This happens most commonly when there is not a very abundant crop of acorns.* If they do not find enough in the woods, they come and search for them in the lands which have been newly sown with acorns, which they do not eat on the spot, but carry to their holes, where they heap them up, and leave them often till they dry and rot. These animals do more harm to land sown for timber, than all the birds and other animals put together." He then mentions, as the only method he had found of preventing this mischief, very nearly the most simple sort of trap which we have used both in Dean and New Forests, but which has proved so inefficient in our extensive plantations. He says, he had used the same means against the *Campagnol*. At first, in the space of about forty acres, he caught about one hundred of the two sorts daily, and had taken, in that space, more than 2,000 in three weeks. He says, that, during the hard frosts, they confine themselves to their holes, and feed on the acorns, &c. they have amassed there. This has been the case in both our Forests.

You will pardon these imperfect compilations from Buffon and Pennant, although they will probably be found of little use after your own more accurate enquiries, and the scientific investigation of Dr. Leach, to whom, at your desire, have been transmitted numerous specimens of the two sorts of Mice in our two Forests, and an accurate drawing and colouring of one of each sort. Perhaps the details given by Buffon may merit a little more attention in this case, than in many others, where that eloquent writer is more than suspected of having too often indulged his imagination and love of theory in his representation of facts; because, as a planter, his personal interest seems to have attracted his attention in a peculiar manner to this particular subject.

Mr. Harvey, a very intelligent person, who has long had the management of Lord Bagot's extensive woods in Staffordshire, has informed me, that some years ago, an extraordinary quantity of Mice made their appearance in those woods. There were no

* There had been an extraordinary failure of acorns in both our Forests the three last years.

very young plantations there, and he did not observe that they gnawed the bark of any of the trees ; but a severe winter having supervened, vast numbers of them were found dead upon the ground. This case contributed to encourage the hope I have before mentioned, that a similar destruction would have happened this year in our Forests, and also furnished reason to conjecture, that the great multitude of those vermin, which infested our inclosures last season, might have only been a sort of accidental epidemical plague, not like to have returned, perhaps, till after our plants should have outgrown the danger of any further injury from them ; for they do not attempt to bark or eat the roots of trees whose stems have acquired a diameter of two or more inches.

It is proper to mention, that they bark indiscriminately, besides hollies and oaks, ash, chesnuts, beech, &c. and, as has been lately observed, even larch and fir.

Mr. Davies informs me, by a letter dated the 5th instant, that in Dean Forest, no Mice have been taken for a very considerable time ; and that having inspected the several inclosures which had been infested with them, no traces of them were then visible, nor any appearance of recent damage ; so that he hopes they may have been effectually exterminated, and that the mischief done last year, will not recur in the ensuing season. Directions however have been given to the woodmen, still to attend to the holes, keeping them open, and inspecting them from time to time.

In New Forest, on the 13th instant, I was informed, that 776 short-tailed and 56 long-tailed had been taken since the 29th ultimo. I continue to have a weekly return from that Forest.

You know the unsuccessful pains I took when the alarming damage which was discovered to be done by Mice in our plantations, by barking the young plants, was first made known to me in the month of May last year, to discover if the same mischief had been observed to be occasioned by those vermin at any former period, either in those Forests or elsewhere, in order to learn whether any methods had been discovered to check or prevent its return ; and your own enquiries were, I understand, long equally

unsuccessful. None of the oldest officers in any of the Royal Forests had ever observed or heard of such a thing, though with the injury done by Mice in destroying acorns when sown or planted, they were all familiarly acquainted. About thirty years ago, several inclosures and plantations of oaks of considerable extent had been executed by Mr. John Pitt, then Surveyor General of Woods and Forests, in New Forest, which at first had appeared to be very promising, but at that time several of the underkeepers having been permitted to establish Rabbit Warrens in different parts of the Forest near the new plantations, and those animals breeding so fast, and in such numbers, it was soon discovered, that the plants rapidly disappeared, and in a few years, no vestige of them remained. This failure of so great a national object, attracted a great deal of attention and observation at the time. Yet, from whatever cause, it was, till within these few years, found impracticable to destroy the warrens, or extirpate the rabbits. At last, however, I myself had the good fortune to devise a method of doing so, which has proved completely effectual. Neither at the time when the destruction of those plantations took place, nor when the extirpation of the rabbits was afterwards so long under consideration, the possibility that Mice, which must have at all times abounded in the furze and fern covers in the Forest, might have had a share in the destruction of the plants by *barking* them, seems ever to have occurred, or at least, to have ever been mentioned by any body on those occasions, though now, in consequence of our late observations, there can be little doubt of that having happened. One of the under-keepers indeed, who had had the most productive warren, alleged to me, *last year*, that he had, *at the time*, mentioned, that the injury was done by Mice; but that nobody would then listen to him, as there was such a general prejudice against the rabbits; but I am very much inclined to think, that this was an after-thought, as neither the deputy, nor any of the other persons then conversant with the Forest, have any recollection of his having said so. However, what you have lately learned to have been observed in Lord Downe's Woods in Yorkshire, proves

that this tendency of the Mice to eat the bark of young trees, had heretofore been observed there.

I have the honour to be,

Dear Sir,

With sincere respect and esteem,

Your very faithful and obliged humble servant,

GLENBERVIE.

ART. LVI. *Remarks on the devastation occasioned by the Hylobius abietis in Fir Plantations, by W. S. MACLEAY, Esq. A.M. F.L.S. &c.*

[In a letter addressed to the Conductors of the Zoological Journal,
4th Dec. 1824.]

GENTLEMEN,

I HAVE attentively perused, at your request, the late Lord Glenbervie's very interesting letter to Sir Joseph Banks, on the important subject of the mischief done to the Royal forests in the years 1813 and 1814; and I think that no reader of the details there so clearly given can be otherwise than convinced that his Lordship has concluded rightly, that the principal cause of the mischief was the unexampled multitude of Mice which then infested these forests. In addition to the strong arguments by which his Lordship proves that the destruction was effected by Mice, the following may be given as almost conclusive to the point that it was not effected by insects. Herbivorous insects, and especially those which are intended by nature to keep vegetable luxuriance within due bounds, have, I believe, been invariably found to affect particular species of trees, attacking them in different ways according to their peculiar economy. Now Lord Glenbervie mentions that the Hollies and Oaks, the Ash, Chesnut, Beech, &c. and, "*as has been lately observed, even Larch and Fir,*"* have been

* From the manner in which the attack on the Larch and Fir is mentioned, the cause of it may have been different, perhaps the *Hylobius abietis*.

barked indiscriminately; and also that this mischief appeared always to be effected in the same manner, that is, "by devouring the bark of the young plants all round, from the ground to the height of about six inches, and in many instances by gnawing the root itself through and through."

Among the variety of curious facts stated in his Lordship's letter, scarcely any can be so interesting to the Naturalist as the temporary nature, or periodical appearance of these Plagues. We can easily conceive that when a forest abounds with an extraordinary number of Mice, they must, like hares and other glirine animals, in the absence of other food, resort to the bark of very young trees; but the difficulty is to comprehend the cause of these swarms being periodical. Many causes may indeed be imagined as tending to promote their increase; but, on perusing the above letter, I do not think that any one can be reckoned as absolutely certain, or sufficient to account for the evil. A few years ago, the neighbourhood of Strasburg was, without any assignable cause, or at least without any cause sufficient to account for their numbers, infested in like manner by swarms of Mice, and the only means that seemed to answer towards their extirpation were the pits so much recommended by Lord Glenbervie. It would appear, however, that the ravages occasioned by Mice in plantations are confined to the young trees; so that in their taste, at least, these animals differ entirely from the greater part of decorticating insects, which usually prefer trees of great size and age. Lord Glenbervie, for instance, says, that Mice do not attempt to bark or eat the roots of those trees, of which the stems have acquired a diameter of two or more inches; and Mr. Harvey states, that when an extraordinary quantity of Mice made their appearance in Lord Bagot's woods, they were not observed to gnaw the bark off, which he accounts for by the circumstance of there being no young plantations there.

Giving, however, all due credit to the valuable details of Lord Glenbervie, and, convinced as I am with him, that the injury done to the young plantations in the Royal forests, was effected by Mice, I would warn the Inspectors of woods and forests that no opinion can be so erroneous, or so hurtful to the trees under their

care, as to fancy that all similar mischiefs must proceed from one and the same cause.

In the Edinburgh Philosophical Journal* I have shewn that the Elm trees in St. James's Park are destroyed by a Coleopterous insect, the *Hylesinus destructor* of Fabricius, or *Scolytus destructor* of Latreille. I have, moreover, in the same Journal, ventured to state it as probable, in my opinion, that all those infectious diseases which destroy only one species of tree in a plantation, are the consequences of the prevalence of particular destructive insects. In confirmation of the truth of this remark, I lately received from J. Loch, Esq., the Agent for the Estates of the Marquis of Stafford and the Earl of Carlisle, a letter, dated Naworth Castle, August 29th, 1824, of which the following is an extract: "There has been lately a great failure of the young Firs and Larches on Lord Carlisle's estates here. It was at first thought to be occasioned by *Mice*, so completely was the bark destroyed. The Wood Warden is now, however, persuaded, that the mischief is done by the insects enclosed in the box sent along with this. The destruction is more rapid where the roots of the Scotch Fir are in a state of decay." This last remark, indeed, goes of itself far to prove that the author of the mischief is an insect, for *Mice* would only attack the green and healthy bark; and to set the question at rest, the insect, of which many specimens were sent, proved to be no other than the *Hylobius Abietis* of Germar, (*Curculio Pini* of the *Entomologia Britannica*,) an insect most destructive to Firs. It is very common in the Pine forests of Sweden and Scotland; but in England, I believe, it has only as yet been found in Cumberland and Shropshire. As a British Insect, it was first made known by the President of the Linnæan Society, who found it at Rivelston Wood, near Edinburgh.

I shall take this opportunity of giving some of its more useful synonyms, as no small portion of obscurity hangs over the identification of the Species, although one of the largest of our indigenous *Curculionidæ*.

Curculio Pini. Lin. Faun. Suec. 589.

Linnæus describes it as most common throughout Sweden, inhabiting

* Vol. xi. p. 123.

the *Pinus Sylvestris*, and devouring its resin; and then in his peculiar style, he proceeds to describe its manners as follows: "*Tarde incedit, arcte apprehendit, tenaciter adhæret, ore frustra cutem mordere tentat captivus.*" There is, however, in this description, evidently something erroneous, for he finishes by observing that the larva spins a subglobose net on leaves, and undergoes metamorphosis in it, thus confounding *Hylobius* with another and very different genus of the *Curculionidæ*.

Curculio Abietis. Lin. Faun. Suec. 615.

The description of this species, by Linnæus, appears to be grounded on his confounding an insect now called *Pissocles Pini*, with a small variety of his original *C. Pini*. He describes his *Curculio Abietis*, which is evidently our insect, as inhabiting the bark of the Pine. It is very similar, he says, to the *Curculio Pini*, but only half the size. This is, however, a mistake according to Paykull, as he ought to have said twice the size, if he was comparing it with *Pissocles pini*.

Curculio Pini. Lin. Syst. Nat. 608. 19.

Curculio Abietis. Lin. Syst. Nat. 613. 57.

Linnæus here appears to think these two species the same, for he remarks, "*Vidi copulâ junctos C. Pini et Abietis.*" The observation would scarcely however have been worth the recording, had he not had in his recollection the examination of the *Pissocles*, when he took it for a small variety of *C. Pini*.

Curculio Abietis. De Geer Ins. 5. p. 204. 1.

Curculio Abietis. Fab. Spec. Ins. 1. 175. 84.

Fabricius, entirely misled by the last mentioned remark of Linnæus, here says, "*Forte varietas sexûs C. Pini,*" which is impossible, for the *C. Pini* of Fabricius is the *Pissocles*.

Curculio Abietis. Fab. Syst. Entom. 138. 59.

Curculio Abietis. Payk. Fn. Suec. 2. 187. 3.

The principal observation of importance here made, is with respect to the size, "*Majores C. germanum fere æquiparant, Minores vix dimidiam ejus magnitudinem attingunt,*"—an observation which accounts for Linnæus's considering his *C. Abietis* as different from his *C. Pini*, and confounding a small variety of this last with the *Pissocles Pini*.

Curculio Pini. Marsh, Ent. Brit. 1. 289. 152.

Here the *Pissocles Pini* is considered to be the *C. Abietis* of Linnæus, and the *C. Abietis* of Linnæus is described under the name of *C. Pini* and all

this confusion is founded on our insect existing in the Linnæan cabinet under the latter name, which, however, may be the case, and yet not in the least invalidate, but rather confirm the accuracy of the synonymy I have above given. In unravelling synonyms, the examination of a cabinet is not of such value as a careful comparison of an Author with himself. Fabricius, for instance, may have marked an insect in his cabinet with a particular name, and yet it may not be that species as described in one of his works, for this Entomologist, as it is easy to discover, was in the habit of forgetting the species of his earlier works, and of describing them under new names.

Further than the above few remarks, accompanying its synonymy, little of the economy of this destructive insect is known; and it is therefore impossible to point out a remedy for the evil, until we have more detailed accounts of the method in which the trees are attacked. The Naturalists in the North might, however, easily acquire some insight into the history of *Hylobius Abietis*, by examining the Fir trees of Rivelston Wood, during the winter season, and watching the larvæ until they make their appearance as perfect insects.

I have the honour, &c.

W. S. MacLEAY.

ART. LVII. *Some Observations on the British Tipulidæ, together with Descriptions of the Species of Culex and Anopheles found in Britain.* By JAMES FRANCIS STEPHENS, F.L.S., &c.

[To the Editors of the Zoological Journal, 30th Nov. 1824.]

GENTLEMEN,

SHOULD the following crude remarks, upon certain families of British Insects, which have hitherto been sadly neglected by the Entomologists of this Country, be deemed worthy of being inserted in the pages of the Zoological Journal, I trust that the purpose for which they were hastily put together will be answered;

and that they will stimulate those individuals whose collections are well stored with nondescript indigenous Insects, to favour the public with an account of them, and not allow them to remain longer concealed in their cabinets, *unnamed and unknown*.

I have the honor to remain,

Gentlemen,

Your obedient Servant,

3, *Leigh Street*,
Burton Crescent.

J. F. STEPHENS.

THE amazing number of new and highly interesting species of indigenous Insects, which have of late years been added to our cabinets by the industry of modern collectors, sufficiently proves the zeal which has animated them, and caused them to exert themselves; but it is greatly to be regretted, that their labours have so seldom been directed to the description or arrangement of the little objects of their research, that our continental neighbours have generally anticipated us in the publication of our native treasures; an endeavour to efface a portion of the stigma which such listlessness has attached to the character of British Entomologists, has led me to attempt a brief descriptive account of such species of the *Tipulideous* genera *Culex* and *Anopheles*, as are found in this country, preceded by some observations, shewing the present state of our knowledge of the *Tipulidæ* in general, and of the above genera in particular.

In the 12th edition of the *Systema Naturæ*, Linnè describes 58 *Tipulæ* only. Fabricius, in his *Entomologia Systematica*, increases the number to 93, and in his *Systema Antliatorum* to 162, —the latter including 35 extra European species. In the 8vo. edition of Meigen's *European Diptera*, (the most complete work on that order hitherto published,) there are about 520 species of this family described, exclusive of 17 of those mentioned by Linnæus, Fabricius, and others, whose identity the indefatigable author has been unable satisfactorily to determine.

Now all the publications of this country, taken collectively, do not enumerate as British, *a tenth* part of the species described by Meigen. In Stewart's Elements of Natural History there are only 32 described, and in Turton's Translation of the *Systema Naturæ* 39 indicated, as natives of Britain; but as the compiler of the former work notices 5 that are not mentioned by the translator of the latter, and Turton introduces 12 that are not in Stewart, in the two works there are consequently 44: to these Samouelle has added the references of 2 others, and Curtis has described and figured 1 more, and registered a second, making in all 48,* which appears to be the total number as yet stated to inhabit the British Isles; the few species figured by Donovan and Harris, being arranged amongst those described by Stewart and Turton. It must, notwithstanding, be added, that the translation of the last-mentioned author will enable the student of British Entomology to ascertain the greater portion of those indigenous species, which are described by Fabricius, but the work itself does not *indicate* more than above stated, as inhabitants of this Island.

For several years past, I have successfully attended to the collection of these fragile and extraordinary Insects, and have been highly gratified to find, not only that my native country is extremely rich in this family; but that we possess several species, and many genera which are not mentioned by Meigen, Latreille, or others, the characters of which I propose, at some future period, to publish, for the benefit of those persons who are disposed to follow my steps; at present I shall content myself by stating, that my cabinet contains 419 indigenous species, exclusive of some very interesting varieties, and that I know about 20 preserved in other collections, that are desiderata with me, and that new species are constantly presenting themselves.

I shall now devote a few remarks to the genera *Culex* and

* Since writing the above, the last named author has published a description and figure of *Limnobia ocellaris* from my collection, and in his remarks upon the genus, he observes, "that there are at least 50 species of *Limnobia* in our cabinets;" which information was principally obtained from an examination of mine, in which are 47 species, exclusive of *Pedicia rivosa* (*Limnobia rivosa*, Meig.)—Dec. 1, 1824.

Anopheles. Linnè describes 7 species of *Culex*, in the 12th edition of his *Systema Naturæ*, 2 of which only belong to the genus according to the modern views of the subject; 1 to the genus *Anopheles*, and the rest to various genera among the *Tipulidæ*. In the last edition of his *Fauna Suecica* he gives 5 of the above as natives of Sweden; amongst which are 1 *Culex* and 1 *Anopheles*.

The *Systema Antliatorum* of Fabricius contains 15 *Culices*, 7 of which are exotic, 3 belong to other modern genera, and the remaining 5 to the genera *Culex* and *Anopheles*. In Meigen's 8vo. edition there are 14 species of *Culex*, and 2 of *Anopheles*; all of which have been identified as natives of this country, except *C. lateralis*, and probably also *C. calopus* and *C. domesticus*.

The only British works in which I find any accounts of the species of the group now under consideration, are the Synopsis of Berkenhout, and the compilations of Stewart and Turton, and in these but 4 are enumerated, a proof of the general neglect or indifference with which the lesser dipterous Insects have hitherto been treated in this country; *—there is, however, a figure of *C. annulatus*, introduced by mistake for *C. pipiens*, in Samouelle's Useful Compendium, but no description of either species is appended.

* The following statement may be adduced in corroboration of the assertion, that we are generally anticipated by the continental writers in the description of our entomological productions. The indigenous *Carabidæ* actually preserved in our cabinets amount to 351 in number, (332 in my collection); 248 of which are described, 229 by Foreign, and only 140 by British, Authors. Marsham enumerates but 109 species of *Carabus* in his *Coleoptera Britannica*, 10 of these are mere varieties, and 1 belongs to the *Staphylinidæ*. This statement may surprize the reader, but if he choose to investigate the subject, he will find that I am within bounds, notwithstanding my friend Mr. Curtis, in his observations on the genus *Nebria*, published so recently as last February, says that we possess only 275 *Carabidæ*: the fact is, that since that period, short as it is, several highly interesting species have been discovered, particularly some noble additions to our Fauna, captured by my friend Dr. Leach, in Devonshire, amongst which *Licinus depressus* of Paykull, *Brachinus glabratus* and *Alpæus castaneus* of Bonelli, and *Zabrus obesus* of Latreille, hold a distinguished place, and tend to show that the subject is far from being exhausted.

Remarks upon the economy and metamorphosis of these curious Insects are, nevertheless, to be met with in the works of several of our countrymen; and in those of that great, but neglected, luminary, Ray, and the modern publications of Shaw, Bingley, and Kirby and Spence, their general history may be obtained.

CULEX Auctorum.

Antennæ porrectæ, filiformes, 14-articulatæ: maris plumosæ; feminæ pilosæ. *Palpi* porrecti quinque articulati: maris proboscidæ longiores; feminæ brevissimæ. *Proboscis* porrecta, longitudine thoracis. *Alæ* squamatæ, incumbentes.—*Meigen*.

1. *Cu. annulatus*. Fabr.

Nigro fuscus; abdomine pedibusque albo-fasciatis; alis punctis quinque fuscis.

Cu. annulatus. *Fabr. Ent. Syst.* v. iv. p. 400*—*Fabr. Syst. Ant.* p. 35*—*Vill. Ent.* v. iii. p. 565*—*Gmel. Syst. Nat.* vol. v. p. 2287—*Turt. Trans.* v. iii. p. 663*—*Meig. Europ. Zweif.* 8vo. v. i. p. 4. tab. 1. f. 10*.

Cu. pipiens. *Sam. Ent. Compend.* pl. 9. f. 5. ♀.*

A highly beautiful insect, and, although frequent during the autumnal months, has not yet been noticed as a British species, except through the accidental introduction of the figure above-quoted by Samouelle, in mistake for *Cu. pipiens*.

2. *Cu. affinis* Mihi.

Rufo-fuscus; abdomine pedibusque albo-annulatis; alis punctis duabus fuscis.

I have seen but one specimen of this insect, captured by myself, at Hertford, in June: it greatly resembles the preceding, but is somewhat smaller and paler; its time of appearance is different.

3. *Cu. Calopus*? *Meigen*.

Fuscus; abdomine argenteo annulato; pedibus nivo annulatis.

Cu. Calopus (Fuscus; argenteo-punctatis; pedibus argenteo annulatis.) *Meig. Europ. Zweif.* 8vo. v. i. p. 3*?

Two specimens (♂ and ♀) of this species are in my cabinet, captured in London; they appear to agree with Meigen's *Cu. Calopus*, but are rather larger; and the rings on the legs are niveous, instead of being silvery.

4. *Cu. cantans*. Hoffmansegg.

Thorace rufo, dorso fusco-vittato; abdomine fusco albo annulato; tasis nigris, articulis omnibus basi latè albo annulatis; alis subhyalinis.

Cu. cantans. (Hoffm.) *Meig. Europ. Zweif.* 8vo. v. i. p. 6. tab. 1. f. 9.*

Common in houses from June to September in this country; but apparently rare on the Continent, as Meigen never beheld the male.

5. *Cu. fumipennis* Mihi.

Thorace nigro fusco; abdomine fusco luteo annulato; tasis nigris, articulis omnibus basi tenuius albo annulatis; alis obscuris.

Greatly allied to the foregoing species, but considerably larger, of a deeper colour, with the thighs nearly black; and the white rings at the base of each joint of the tarsi nearly obsolete; the wings obscure. This appears to be common at Ripley in Surry, where I took several specimens in January last, all of which, save one female, were destroyed by the ravages of a new and highly destructive species of Clothes-Moth, or true *Tinea*, which I shall characterize below.*

* *Tinea destructor* Mihi.

Ti. luteo-testacea; alis anticis flavo-testaceis immaculatis, posticis cinereo-testaceis, ciliis omnibus flavo-testaceis; fronte fulvo.

This mischievous little Moth, which somewhat resembles *Tinea flavifrontella*, Fabr., has recently increased to an alarming extent in some parts of London. I have witnessed several instances of the vexatious havoc that has been caused by the ravages of its larvæ, which are infinitely more ruinous to Zoological collections than those of either of the other species of the genus; and being, apparently more tenacious of life, they resist the effects of camphor in a most surprizing degree. It is a curious fact, that this insect remained unique in Mr. Haworth's cabinet for upwards of twenty years, although so abundant now: it is there named in manuscript, but I believe, merely from the peculiar

6. *Cu. ornatus*. Hoffmansegg.

Thorace albido nigro bivittato; abdomine fusco albo annulato; pedibus fuscis, genubus puncto niveo.

Cu. ornatus. (Hoffm.) *Meig. Europ. Zweif.* 8vo. v. i. p. 5. *

Cu. equinus. *Meig. Klass. &c.* v. i. p. 3. *.

One female only of this species has come under my observation, taken at Hertford; time unknown. Meigen has changed its name in the 8vo edition of his book, and adopted the appellation given to it by his friend Count Hoffmansegg, as it proves not to be the *C. equinus* of Linné.

7. *Cu. sylvaticus*. Meigen.

Fuscus; abdomine albo annulato; palpis pedibusque pallide fuscis.

Cu. fasciatus. *Meig. Klass. &c.* v. i. p. 4. *.

Cu. sylvaticus. *Meig. Europ. Zweif.* 8vo. v. i. p. 6. *.

Meigen has also changed the name of this species (of which I have seen but one specimen (♂), taken in June, at Coombe Wood) in deference to Fabricius, who applies the name *fasciatus* to an American insect in his *Systema Antliatorum*, notwithstanding the first edition of Meigen's work is quoted by him in the same page.

†8. *Cu. maculatus*. Meigen.

Thorace rufo nigro lineato; abdomine fusco annulato; pedibus fuscis, femoribus luteis

Cu. maculatus. *Meig. Europ. Zweif.* v. i. p. 6. *.

A very distinct species, and one of the largest of the genus; the only specimen I have yet seen is in the collection of my friend J. Curtis, Esq. who captured it in Suffolk.

9. *Cu. nemorosus*. Meigen.

Thorace rufo fusco vittato; abdomine fusco albo annulato; genubus puncto niveo.

Cu. reptans. *Meig. Klass. &c.* v. i. p. 3. *.

colour of its frontal crest. I have, therefore, applied the above name as being indicative of its injurious qualities. May not this be the insect of which Latreille says, *musæorum galliæ pestis*?

Cu. nemorosus. Meig. *Europ. Zweif.* v. i. p. 4. *.

The name of this species is likewise changed by Meigen in the 8vo edition of the *Klassificazion*, &c. for similar reasons to those stated under *Cu. ornatus*. Not uncommon in August.

10. *Cu. domesticus* ? Germar.

Luteo fuscus, abdomine atro; segmentis margine cinereo villosis.

Cu. domesticus. (Germ.) Meig. *Europ. Zweif.* v. i. p. 8. *?

One male and two females of a species which appears to agree with the above characters of Meigen, are in my collection: taken at Hertford.

11. *Cu. pipiens.* Linné,

Thorace rufo, lineis duabus obscuris; abdomine cano fusco annulato; pedibus pallidis.

Cu. pipiens. Lin. *Syst. Nat.* v. i. pt. ii. p. 1002*—Lin. *Faun. Succ.* No. 1890*—Gmel. *Syst. Nat.* v. 5. p. 2286—Turt. *Trans.* v. iii. p. 663 *—Fabr. *Spec. Ins.* v. ii. p. 469 *—Fabr. *Ent. Syst.* v. iv. p. 400 *—Fabr. *Syst. Ant.* p. 33 *—Degeer. *Ins.* v. vi. p. 127, tab. 27.—Reaumur *Ins.* v. iv. tab. 43, 44— Geoff. *Ins.* v. ii. p. 579. tab. 19. f. 4. *—Vill. *Ent.* v. iii. p. 562. *—Schell. *Mouch. dipt.* pl. 41. *—Schrank. *Ins. Aust.* No. 980—Schra. *Fau. Boic.* v. iii. No. 2565—Stew. *Elem.* v. ii. 268 *—Samo. *Ent. Compend.* p. 71, 290 (no description) *—Berk. *Syn.* v. 1. p. 166 *—Shaw. *Gen. Zool.* v. vi. pt. 2. p. 387. *

This is by far the most abundant species of the genus, at least in the neighbourhood of London, where it may be found at all times during the summer months.

12. *Cu. marginalis.* Mihi.

Rufus; thorace obscuriore; abdominis segmentis nigro marginatis.

The abdomen of this insect, at first sight, greatly resembles that of *Leia fasciola*, Meigen, its colours being differently disposed to those of any other British *Culex*, as the margin of the

segments are black in this, and the segments themselves rufous ; whereas in the rest of the genus the margins are pale. I have one female only ; taken in London.

13. *Cu. bicolor*. Megerle.

Thorace nigricante ; abdomine pedibusque pallidis.

Cu. bicolor. (Meg.) *Meig. Europ. Zweif.* v. i. p. 9. *.

I possess two females, captured at Hertford in June.

14. *Cu. punctatus*. Meigen.

Abdomine cinereo, nigro maculato.

Cu. punctatus. *Meig. Europ. Zweif.* v. i. p. 9. *.

I have seen but one specimen of this species, which, with *Ctenophora pectinicornis* and *Tipula gigantea*, comprised the entire series of the late Mr. Marsham's TIPULIDÆ !

15. *Cu. lutescens*. Fabricius.

Luteus, tarsi fuscis.

Cu. lutescens. *Fabr. Spec. Ins.* v. ii. p. 470. *—*Fabr.*

Ent. Syst. v. 4. p. 401 *—*Vill. Ent.* v. iii. p. 565 *—

Fabr. Syst. Ant. p. 35 *—*Gmel. Syst. Nat.* v. v.

p. 2888.—*Turt. Trans.* v. iii. p. 664.

One male and two females of this insect are in my collection ; captured at Darenth in June and July.

16. *Cu. rufus*. Hoffmansegg.

Rufus ; thorace fusco-trilineato ; abdomine fusco annulato.

Cu. rufus. (Hoffm.) *Meig. Europ. Zweif.* v. i. p. 7 *.

Common at Hertford during the summer.

ANOPHELES. Meigen.—CULEX. Linné, &c.

Antenna porrectæ, filiformes, 14-articulatæ : maris plumosæ ; feminis pilosæ. *Palpi* porrecti, quinque articulati ; longitudine proboscidis. *Proboscis* porrecta, longitudinæ thoracis. *Alæ* squamatæ, incumbentes.—*Meigen*.

1. *An. bifurcatus*. *Meig. Europ. Zweif.* v. i. p. 11 *.

Alis immaculatis.



- Cu. bifurcatus. *Lin. Syst. Nat.* No. 1. pt. ii. p. 1002 *—
Lin. Faun. Suec. No. 1851 *—*Fabr. Spec. Ins.* v. ii.
 p. 469 *—*Gmel. Syst. Nat.* v. v. p. 2887—*Vill. Ent.*
 v. iii. p. 563 *—*Schr. Ins. Austr.* No. 982—*Schr.*
Fam. Boic. v. iii. no. 2566—*Stew. Elem.* v. ii.
 p. 269 *—*Berk. Syn.* v. i. p. 166 *.
- Cu. trifurcatus. *Fabr. Ent. Syst.* v. iv. p. 401. *—*Fabr.*
Syst. Ant. p. 35. *—*Turt. Trans.* v. iii. p. 664. *.
- Cu. claviger. *Meig. Klass. &c.* v. i. p. 4. tab. i. f. 8. *—
Fabr. Syst. Ant. p. 35. *.

The only specimens of this interesting species I have seen, are a male, in my cabinet, taken on the 14th of June last at Hertford; and a female, in the collection given to the British Museum by my friend Dr. Leach.

2. *An. maculipennis.* *Meig. Europ. Zweif.* v. i. p. 11. tab. 1.
 f. 17. 9. *.

Alis punctis quinque fuscis.

- Cu. bifurcatus. *Meig. Klass. &c.* v. i. p. 5. *(+)

I possess several specimens of this variable species, but amongst them one male only has occurred: there is one specimen (a female) in the collection at the British Museum. My specimen was found in May at Hertford.

ART. LVIII. *Description of a new species of Lizard.*
 By THOMAS BELL, Esq. F.L.S.

Fam. STELLIONIDÆ. Mihi.

Genus. UROMASTYX. Merrem.

Acanthinurus. U. Dorso lævi; caudâ depressâ, subcarinatâ,
suprà valdè spinosâ, subtus lævi.

Tab. xvii.

† The asterisk (*) attached throughout to the Synonyma, denotes that I have personally examined them; the rest are extracted from Meigen's works.

Habitat in Africâ.

In Mus. Nost.

Back smooth ; tail depressed, slightly carinated, strongly spined above and at the sides, smooth beneath.

Two specimens of this lizard were brought from Africa by Captain Lyon, R.N.

The head is somewhat triangular, the upper part covered with moderately large scales, those towards the back part slightly elevated. The scales beneath the under jaw, and of the thorax and neck, are very minute and quite smooth.

The teeth of the upper jaw are seventeen on each side, the anterior ones extremely minute, the back teeth becoming gradually larger ; in front of the jaw is a large perpendicular trifid process of bone, which appears to serve the purpose of incisive teeth.

The lower jaw is likewise furnished with about seventeen teeth on each side, gradually encreasing in size backwards, except that the two front ones are comparatively large and long, diverging from each other, so as to correspond with the back surface of the central process of bone in the upper jaw.

The tongue is large, thick, and fleshy, and, like that in all others of this division of the order, bifid only at the extremity.

The eyes are rather large, and the lids covered with very small scales.

The ears are placed laterally at the back part of the head ; the *membrana tympani* is exposed, almost superficial, and covered only with cuticle.

The whole of the back is covered with very small smooth scales ; those near the tail larger and a little raised. The scales of the belly, which are of larger size, are closely imbricated and polished, so as to present an extremely smooth surface.

The legs are rather long, and strongly made. The fore legs, which are the shortest, are covered at the outer part with moderately large, slightly elevated scales ; those of the inner surface next the body are smaller and closer. The feet and toes are scabrous beneath. The toes are nearly cylindrical, and terminated by strong hooked claws. The scales covering their upper surface are few in number, imbricated, and gradually larger towards the

extremity. Of the toes, the first (answering to the thumb) is the shortest, the fifth next in length, then the second, the third, and the fourth the longest.

The scales of the outer part of the hinder legs are much elevated and almost spiny; those of the inner surface smooth. The toes follow the same gradation with respect to their length as those of the fore feet; the outer or fifth toe is very much separated from the fourth, and is united to the metatarsus in a lateral direction, considerably higher up than the others.

The femoral pores are fourteen on each side, extending from near the centre, about two lines anterior to the opening of the *cloaca*, along the inner side of the thigh, through nearly its whole length.

The tail is large, depressed, slightly carinated above to a short distance from the base, and tapering gradually to the extremity. The scales which cover it on the upper part and sides are very large and strong, each terminating behind in a sharp elevated spine. Those of the under surface are smooth, of a smaller size and closely imbricated. The whole are arranged in about eighteen distinct rings, becoming gradually thicker and deeper, and the upper scales larger and more strongly spined towards the extremity. Those of the sides, are also larger and more prominent than the others; on the under side, each ring is partially covered by the segment of another band of similar scales, which is also the case on the upper part with the rings nearest the base.

The following are the dimensions of the animal, and of some of the principal parts, in inches and decimals of an inch.

| | |
|--|------|
| Total length from the nose to the end of the tail | 11·7 |
| Length of the head | 1·5 |
| Width of the head at the ears | 1·3 |
| Length of the body from the occiput to the origin
of the tail | 5·7 |
| Length of the tail | 4·5 |
| Width of the tail near the base | 1·4 |
| Length of the longest caudal scale | ·4 |
| Length of the fore leg and foot | 2·8 |
| Length of the fourth or longest toe | ·6 |

| | |
|--------------------------------------|-----|
| Length of the shortest toe | ·3 |
| Length of the hind leg and foot..... | 3·5 |
| Length of the longest toe..... | ·8 |
| Length of the shortest toe | ·3 |

In consequence of the individual in my possession having been kept in spirits, and become very flabby, it is impossible accurately to ascertain the circumference of the body; on fully inflating the lungs however, I found it about six inches.

The colour has become nearly obliterated by long preservation in spirits. The whole of the body is mottled, above and below, the ground colour of the belly being the lightest part. The tail is brown above, lighter underneath, and the scales on the upper part are mottled somewhat like tortoise-shell. Another specimen which was stuffed and preserved in a dry state was similarly mottled, but altogether of a lighter colour.

The species, with which from mere verbal description, it is most likely to be confounded, are *Uromastix cycchurus*,* Merrem, *U. spinipes*,† *U. cæruleus*,‡ and *U. azureus*|| of that author. From the first (which however is not the Quetz Paleo of La Cépède as is erroneously stated by Merrem,) it differs in the depressed form of the tail and the smoothness of its under surface, whilst in that species the tail is round, and the under side as well as the upper is spinous. From the second it is distinguished by the form of the tail, which is round in *U. spinipes*. From *U. cæruleus* it differs considerably in the proportion of the tail to the body as well as in other characters, and from *U. azureus* it will be readily known by the tuberculated surface of the back and head, and the quadrate form of the tail in the latter species.

* *Le Léopard Quetz-Paleo*. Lacep. *Quadr. ovip.* I. p. 497. *Stellio Quetz-Paleo*. Daud. rept. IV. p. 26.

† *Stellio spinipes*. Daud. IV. p. 31. Geoffroy, *Rept. d'Egypte*. T. 2. f. 2.†

‡ *Stellio azureus*. Latr. Rept. II. p. 34. Daud. IV. p. 36. T. 46.

|| *L'azuré*. Lacep. I. p. 362. *Stellio brevicaudatus*. Daud. IV. p. 40. T. 47. Latr. II. p. 29.



ART. LIX. *Description of Malaconotus atro-coccineus.*
By WILLIAM J. BURCHELL, Esq. F.L.S.

THIS species being of interest as one of the late additions to African zoology, and being at the same time one of the more showy birds of the country, some more particular description of it may not perhaps be unacceptable.

For the purpose of preserving uniformity of nomenclature in the Zoological Journal, I have here adopted the generic term *Malacotus* as defined in the excellent paper on the *Laniadæ* in the preceding Number of this work; although I have already mentioned this bird under the name of *Lanius*.* It has, in colours at least, a close affinity with *Lanius barbarus*; from which it differs principally by the white stripe down the wing, and by its head being entirely black, instead of tawny or yellow: besides which there are other marks which concur to prove them not only truly distinct species, but probably of different groups; although, at first sight, appearing to exhibit great mutual resemblance. (See plate xviii.) Whether this bird be left with the *Lani*i of Linnæus, or separated from them as a *Malaconotus*, the following short character will perhaps be found sufficient for the purpose of distinguishing this species from all those which have hitherto been described.

Malaconotus atro-coccineus. Caput et corpus supra nigra; subtus, tota a gulâ ad crissum, coccinea. Alæ utrinque nigrae, lineâ albâ longitudinaliter notatæ. Cauda nigra; rectricibus duabus extimis aliquando maculâ flavorubente in apice notatis. Uropygium sparsè et indistinctè albo lituratum.

And as a supplement to this character may be added,

Pedes, rostrum, ungues, et irides, nigri. Nares setulis brevibus incumbentibus tectæ. Plumæ tibiales (femorales vulgò) nigrae, sed suffragini proximæ et internæ, aliquando albicantes vel flavicantes. Macula triangularis roseo-albida vel flavida, in apicibus rectricium

* Travels in Southern Africa, vol. 1, p. 337.

extimarum, sæpius deest; nec pro notâ sexûs habenda est, quum mares maculati et immaculati occurrunt. Linea alba alaris ex marginibus albis remigis secundariæ quintæ et sextæ, efficitur: quæ linea per tectrices ducitur in humerum (metacarpum.) Plumæ abdominales pectoralesquæ, extus quamvis totæ coccinæ appareant, sunt reverà basi nigræ, medio albæ: dum jugulares gularesque, basi tantum albæ. Remex prima reliquis dimidio brevior; secunda sub-brevior; et tertia vel quarta, inter longiores. Rectrices sub-æquales, exceptis duabus extimis paululum brevioribus. Lingua acuta, apice bifida, basi sagittata retrorsum serrata. Longitudo ab apice rostri ad ultimam caudam novem pollices.

This bird inhabits the woods along the rivers *Gariép* and *Kygariep*; and it was also met with in the country of the *Bachapíns*, near the river *Kruman*, at a spot which I have designated in the map by the name of *Mokāla-Grove*, where the large and beautiful trees of *Acacia giraffæ* (*Mokāla*) are the resort of many handsome and rare species. To a traveller wandering through the airy groves of the *Transgariep*, the sight of these *Laniï*, flying from branch to branch above his head, and displaying their fine colour in all its brilliancy, suddenly arrests his steps and claims his admiration. Viewed in such a position, little of their black colour is seen; and they then appear to be entirely scarlet.

During my residence at the town of *Litākun* (*Litākoon*), I obtained the *Bachapín* names of a considerable number of birds; and that which was given to the present species, was *Korrokóba*. It was seen chiefly in the months of October, November, and December, or the commencement of summer; and was met with only between the latitudes of 27° 20', and 29° 10' S., and on the meridian of 24° E.: I do not intend by this remark, to imply that it may not perhaps be found at other seasons, or that it may not be dispersed over a greater extent of country. I do not, however, believe that it ever migrates to the southward of the river *Gariép*.

ART. LX. *On the Characters and Natural Affinities of several New Birds from Australasia ; including some Observations on the Columbidae. By WILLIAM SWAINSON, Esq. F.R. & L.S. M.W.S., &c.*

THE vast Island of New Holland, or Australasia, presents to the philosophic Naturalist a more interesting field for enquiry, than any other division of the globe. Extending from Lat. 10 to 43 S., and spreading over 44 degrees of Longitude, this *terra incognita* occupies a surface little inferior to the Continent of Europe. Yet of this extensive tract, even the coasts are but imperfectly known ; while the interior presents, in our best maps, an unlettered blank. Of its natural productions we may be said, comparatively, to know nothing. It is true that such districts as are in the vicinity of our settlements, have been partially explored, and that their productions have excited the astonishment and enquiries of European philosophers. But when we turn to the map, and see what an insignificant proportion such districts bear to the whole of New Holland, we are struck with our present ignorance, and lost in conjectures on the unknown forms of animated beings which may people the interior of this remote region.

To the Linnean Society of London belongs the honor of having formed the most extensive collection of the Zoological productions of Australasia now in this country. A few liberal and enlightened members of that learned body conceived it would be rendering an important service to British Naturalists, to collect together for their information and instruction the productions of the most extensive Colony under our dominion. Such a project is surely worth the attention of the Directors of our National Museum, for it is in *their* power to extend and facilitate an undertaking of this nature, infinitely more than can be expected from the exertions of a few private individuals. The present Administration have always evinced, in the most decided manner, a prompt desire to facilitate the advancement of Science, when the means have been suggested to them. Australasia is entirely our own ; and, in all pro-

bability, will become hereafter the ruling power of the southern hemisphere. Its commerce even now, administers to the necessities and comforts of the mother country. With these growing advantages, let us hope that Science will not be forgotten, and that our Public Repositories of knowledge will be stored with the native productions of those remote regions; not merely to excite admiration, or to gratify idle curiosity, but to furnish such materials as may enable British Naturalists to take the lead in those general enquiries into the laws of Nature, which are now occupying the attention of some of the greatest philosophers on the Continent of Europe.

Independent of the interest, which in a national point of view attaches to the Zoology of Australasia, that country presents a very remarkable feature in the peculiarity of structure that pervades by far the greatest part of its animal productions. This is strikingly evinced in the department of Ornithology; for although we meet with a few groups of birds in New Holland, which are likewise distributed in Southern Africa, and others which assimilate to forms more properly belonging to the Indian Archipelago, yet, generally speaking, the Ornithology of Australasia is peculiar to itself. So much so, indeed, that an experienced Naturalist, having a hundred birds placed before him, of species he had never before seen, might with tolerable certainty select all those that came from this strange country. Many families which are found in other divisions of the globe are here unknown, or are represented under different forms; or, if I may be allowed the expression, are *disguised*; but at the same time betray such a peculiarity of habit, as at once to stamp them as natives of Australasia. In fact, a symbolical relationship seems to be almost universal. Nevertheless, so imperfect is our knowledge of the interior Zoology of this country, and even of the manner and habits of such species as are already familiar to us, that any thing beyond a few general conclusions must not, at present, be attempted.

Every new expedition that has been set on foot by the local government, for the purpose of extending our geographic knowledge of the interior, has returned with fresh proofs of the Zoological treasures it contains. Some of these, supposed to have been

collected during the late survey of a tract hitherto but little known, were brought home a few months ago; and have fallen under my inspection through the kindness of ——— Brogden, Esq. M.P. in whose possession they now are. A few others have been presented to me by my friend Baron Field, Esq. who has recently returned from the same country, and from whom the public may soon expect some valuable information on the geographical and geological features of those distant regions.

In laying before the scientific world the result of my observations on these new additions to our Australasian Fauna, I trust the example will be followed by other British Naturalists, and that they will be induced to seize every opportunity of recording those undescribed animals, in every department of Zoology, which have been discovered by themselves, or are continually arriving from our distant colonies. In a general point of view, it matters little who are the reapers employed to gather in the harvest which Nature every where opens to us. But I think it is a national reproach to suffer our Continental neighbours to come over, and draw the materials for their valuable works, from our own public and private Museums. To what an extent this has been done need not be told. Yet this procrastination on our part, in most cases, springs from a laudable, though erroneous motive. We aim at a point of perfection never to be attained. Year after year we keep back that knowledge we have already acquired, in the hopes of rendering it more perfect. New discoveries arise, yet we wait for more. Meanwhile the stream of life is slowly passing from us; we find those discoveries, on which we had built our future fame, anticipated by contemporaries. Our plans gradually become too vast for execution; until, discontented and disheartened, we relinquish them altogether; and discover, too late, the futility of aiming at that perfection which belongs only to beings of a superior order.

Forcibly impressed with this conviction, I shall make no apology on this, or any future occasion, for laying before the readers of this Journal detached descriptions, or isolated remarks on such new objects as may come before me; imperfect as these observations may be, they may stimulate the inquiries of others; and, at

all events, will secure to this country in some measure the credit of making known the natural productions of her own possessions.

CEBLEPYRIS lineatus.

Tribe. Dentiostres. Cuvier.

Family. Laniadæ. Mihi.

Division. Ceblepyrina. Id.

C. cinereus; pectore corporeque infrà albis lineis frequentibus transversis nigris variis; rectricibus nigris.

Cinereous; breast and body beneath white, banded by narrow black lines; tail feathers black.

According to the distribution I have already proposed of the family of *Laniadæ*, the genus *Ceblepyris* of modern authors forms one of the five divisions of that group. Among the species already known to us, we find a considerable variation in the strength and size of their bills, but their structure in every other respect, (in such as I have had the opportunity of examining,) presents so few deviations of character, that I shall refrain, at present, from proposing any subdivisions of the group.

Total length about ten inches, bill moderate, the culmen carinated. The general colour of all the upper plumage, and of the chin and throat beneath, is light cinereous; the breast and all the under parts of the body, as well as the inner wing coverts are white, closely banded by narrow transverse lines of a deep black colour: the space between the bill and eye is also black. The wings are moderately long and pointed; the quills are black, with the exterior half of the outer webs cinereous, and margined by a narrow line of whitish: the first quill is half as long as the second, which is again shorter than the third, and this last is very nearly as long as the fourth. The tail is black and obsoletely rounded, the two middle feathers cinereous at their base. Two specimens of this apparently undescribed species belong to Mr. Brogden.

Total length 10 inches; bill nearly 1 inch from the gape; tail 4, wings $5\frac{3}{4}$ inches.

CEBLEPYRIS tricolor.

C. nitidè niger, albus infra; crisso tegminibusque superioribus cinereis; tectricibus rectriciumque apicibus albis.

Glossy black, beneath white; rump and upper tail coverts cinereous; wing coverts and tips of the tail feathers white.

This is by far the smallest species of this group I have hitherto seen. It is likewise interesting, as it differs in several respects from the other *Ceblepyrinae*. The bill is more slender, and its sides more compressed; the nostrils, instead of being completely covered by the frontal feathers, are partially exposed; and form an angular sulcation covered by the membrane. The tarsi are somewhat lengthened; and the wings longer, more pointed, and obviously adapted for a superior flight; the first quill being very short, while the second is scarcely shorter than the third, and decidedly longer than the fourth. How far these deviations may be relied upon as affording sectional characters, I am at present not prepared to state; yet I cannot help thinking they point out a strong relationship to the *Muscicapidae*.

Size rather larger than a Lark. The upper plumage, from the head to the middle of the back, is deep black, glossed with a metallic lustre of dull greenish blue; the lower part of the back, as well as the rump and upper tail coverts, are pale cinereous; the spiny shafts of the feathers in these parts are very weak, yet sufficiently strong to show the natural situation of the bird. The under plumage, (including the sides of the neck and ear feathers,) is pure white. The whole of the lesser, and part of the greater wing coverts, are also white; so also are the margins of the scapulars, and part of the greater quills. Tail black and rather lengthened, the two outer feathers graduated, the rest nearly of equal length, and all of them tipped with white. The lateral scales of the tarsi, as in all the *Ceblepyrinae*, are entire.

Length of the wings 6 inches, bill $\frac{6}{8}$ from the gape. Tail nearly 3 inches, (one half being hid by the upper coverts,) tarsi $\frac{5}{8}$.

In the collection of Mr. Brogden. There is also in Mr. Vigers's possession a species closely allied to this, but supposed to have come from Java.

PITTA *versicolor*.

Family. Merulidæ. Vigors.

Division. Myiotherina. Mihi.

Genus. Pitta. Vieillot.

P. viridis, infra fulva; uropygio tectricibusque cæruleis, ano rubro; vertice rufo; nuchâ, mento, maculâque abdominali nigris.

Green, beneath fulvous, rump and wing coverts cærulean blue; vent red; crown rufous; nape, chin, and abdominal spot black.

The *Turdus Colma* of Linnean writers, (from which Illiger drew the characters he has assigned to the genus *Myiothera*) may probably be found to represent the type of a distinct division in the family of *Merulidæ*; in which all the short-tailed Thrushes, with ambulating tarsi, found in the tropical latitudes of the Old, and the New World, as well as in Australasia, will be brought together.

The genuine *Pitta*, as far as I can discover, are confined to India, its adjacent Islands, and Australasia. There is such a general similarity of plumage among the species, that Doctor Latham was induced to consider such as were known to him when he wrote, as varieties of his short-legged Crow; yet modern Ornithologists hold a contrary opinion. The present bird, in particular, so closely resembles the *Pitta cyanoptera* of M. Temminck, (beautifully figured in the *Planches Coloriées*, Liv. 37. pl. 218.) that a doubt may arise, in some minds, whether they should be considered as separate species. My reasons for adopting the contrary opinion, are founded on their geographic situation, and on those modifications in the colouring of their plumage, which I shall presently detail. *P. cyanoptera* inhabits Java, while *P. versicolor* is an Australasian bird. The former is nearly two inches smaller; the greater quills (if the above figure be correct,) are much longer than the scapular quills; while in our bird, they are almost of the same length. Next as to colour; the black spot on the chin in *P. cyanoptera*, is very small, and the throat pure white; whereas in the Austra-

lasian species, the black spot is very large, and ends in a lengthened point down the middle of the throat, which is *fulvous*. In *P. cyanoptera*, the white on the wings is spread over half the quills; but in the other, this spot can scarcely be seen: in *that* the tail is tipped with blue; in *this* with dull green. Lastly, *P. cyanoptera* is without the black spot in the middle of the abdomen, which is so conspicuous in our bird. These comparisons may be tedious, but are essential, not merely as relating to these two birds, but as affecting the question on the insulated character of the terrestrial birds of Australasia. I shall now describe the species in question.

Size rather larger than the Song Thrush. Length from the bill to the tail nine inches and a quarter. The ground colour of the upper parts is pure olive green; the greater wing coverts, and the external half of the lesser quill feathers, are the same. (In *P. cyanoptera* the greater wing coverts are blue.) On the chin is a large pointed patch of black, which unites to a broad band on each side of the head, encircles the crown, and again forms a pointed patch on the upper part of the neck. The crown is deep ferruginous, with a narrow black stripe down the middle. The shoulders and lesser wing coverts are bright cærulean blue, having a silvery metallic lustre, not unlike the gloss on silk; and across the rump is a band of the same colour. The upper tail coverts are black; the tail itself very short, the two middle feathers rather the shortest, and all of them black, tipped with olive green. The greater quills hardly exceed the others in length; they are black, with pale tips; and at the base of the fourth, fifth, and sixth, is a small white spot. The sides of the neck, the throat, and all the under parts are buff colour, except the vent, middle of the belly, and under tail coverts, which are of a beautiful red; in the middle of the abdomen is a patch of black. The bill is black, and the tarsi pale yellowish.

A beautiful specimen of this bird is in Mr. Brogden's collection.

The relative dimensions of *P. versicolor* and *cyanoptera* (the latter taken from the figure in Pl. Col.) are here subjoined.

| | <i>P. versicolor.</i> | <i>P. cyanoptera.</i> |
|-----------------------------------|-----------------------|-----------------------|
| Total length, from the tip of the | INCHES. | INCHES. |
| bill to the end of the tail..... | 9 $\frac{1}{4}$ | 7* |
| Bill from the gape | 1 $\frac{1}{2}$ | 1 $\frac{2}{10}$ |
| Wings in length..... | 5 | 4 $\frac{3}{4}$ |
| Tail..... | 1 $\frac{3}{4}$ | — |
| Tarsi | 1 $\frac{3}{4}$ | 1 $\frac{1}{2}$ |
| Hallux and claw | 1 | $\frac{3}{4}$ |

COLUMBIDÆ.

The extensive genus of *Columba*, like that of *Falco*, has been pronounced *indivisible* by an eminent Ornithologist of the present day; who, from having made these birds his peculiar study, is in one sense pre-eminently qualified to give a decided opinion. The principle he has laid down, and on which this opinion consequently is founded, is, that whenever intermediate species are discovered which serve to unite two neighbouring genera, such genera should invariably be united. This theory has been, in my mind, completely refuted in the pages of this Journal; and is so calculated to destroy, not only the valuable labours of its author, but all those artificial arrangements which have been invented to facilitate our acquaintance with Nature, that I shall not stop to give it further consideration. It is admitted that there are certain peculiarities of form, and of economy among the *Columbidæ*, which point out natural divisions. Some of these have been used for the construction of genera by MM. Le Vaillant, Vieillot, and Cuvier, and of sections by M. Temminck; but the immense number of species already known, and the great influx of new ones, renders it essential that many others should be formed. As we labour under a comparative ignorance of the natural economy of the vast number of tropical species recently described, any attempt to throw the *Columbidæ* into their natural arrangement must be very imperfect. The basis of such a work must rest on their natural habits, their food, and their geographic distribution. Yet, as we see in other natural families that a pecu-

* "Longueur, sept pouces." Pl. Col. pl. 218.

liarity of economy is almost invariably accompanied by some corresponding modification of structure, we shall receive considerable assistance by accurately examining such variations. We may note the forms, without being acquainted with their reference to the peculiar habits of the group; and, although our inference, in some cases, may be erroneous, in others we shall not be far from the truth. The Passenger Pigeons, for instance, have their first quill feather as long as any of the others; a sure indication of that rapid and long-continued power of flight they are known to possess. The *Columbi-Gallines* of M. Le Vaillant* are described as having naked and somewhat lengthened tarsi; a structure well adapted to those ambulating habits, which bring some of them close to the *Phasianidæ*, Vig., and others to the *Cracidæ*, Vig.

Another group,† the *Colombars* of M. Le Vaillant (*Vinago*, Cuv., *Treron*, Vieil.,) have a strong hard bill; and their short clasping tarsi covered with feathers, leads us to conclude they seldom perch upon the ground; in fact, MM. Le Vaillant and Cuvier both assert that these birds are only found in the tropical forests of the Old world. Apparently confined to the same regions, we see another group, wherein the bill partakes of that weak structure observed in the generality of Pigeons, while the tarsi are thickly clothed with feathers, similar to the group last mentioned. These seem to be the principal divisions among the *Columbidæ*. Minor distinctions may be founded on the relative length and structure of the quill feathers, which in some are very peculiar; and, as being connected with the powers of loco-motion, deserve our attention. Some writers have attached more importance to the form of the tail; and have therefore divided the *Columbidæ* into two great divisions: separating such species as have this organ rounded or lengthened, from those in which the tail is short and even. This plan, however it may help to discover a *species*, is obviously artificial, and totally inadequate to give us any ideas on

* Le Colombi-galline a Carnail. Ois. d'Af. 6 tab. 279. Le Colombi-Hocco, pl. 280. Le Colombi-perdix a cravate noire, pl. 281. Le Colombi-perdix roux-violet, pl. 282. Le Colombi-caille, pl. 283.

† Le Colombar. Ois. d'Af. 6. pl. 276, 277. *Columba capellei*. Tem. Pl. Col. liv. 24. tab. 143. &c.

natural groups. The tail, in fact, is but an accessory help to the wings, and therefore deserves an inferior consideration, although its form may be usefully employed in sectional divisions. Among the characters which may perhaps guide us in distinguishing inferior groups, or at least sections, may be noticed the naked orbits so conspicuous in several exotic species.* The Ground Doves of the New World† show a peculiar character in having the sides of their tarsi margined by a row of minute feathers, which often conceal the knees. Their first quill feather is also very broad, and almost as long as any of the others : if these characters hold good in more instances than those I have quoted, we shall be justified in using them in a generic sense, by separating these birds from the other *Columbi-Gallines* of M. Le Vaillant. Allied to the Ground Doves in manners, but greatly distinguished from them in the structure of their feet, is the Bronze-winged Pigeon of Australasia, (*Col. chalcoptera*, Lath.) ; in this, the frontal scales of the tarsi, (unlike any other species I have yet seen,) are formed of two series ; while those of the sides are reticulated and very minute : the hind toe (or hallux) is also remarkably short, and clearly evinces an approximation to the more perfect *Gallinaceæ*. Many other indications of particular groups may doubtless be discovered by naturalists whose materials for inquiry are more extensive than my own. In giving this hasty and imperfect sketch of the family, I have only been desirous of proving that it contains distinct groups, and *bonâ fide* genera ; as fully capable of definition as any others already admitted into our Systems. We can do no more than make the best use of those materials within our reach ; and probably these hints may elicit further observations from naturalists who are more fortunate than myself in possessing a numerous collection of birds.

* *Columba Franciæ*. Gm. 779. (Le Ramier Hérissé. Vail. Ois. d'Af. 6. 267.)
C. auricularis. Tem. (8vo) 236. *Col. gymnophthalmus*. Tem. 225.

† *Columba martinica*. Lin.—*Columba passerina*. Lin. Wilson. Am. Orn. Vol 6. pl. 46. f. 2, 3.

Genus. PTILINOPUS. Mihi.

Generic Character.

Alæ mediocres, remigum pinnâ primâ apicem versus contractâ, tertiâ quartâque longissimis.

Rostrum gracile.

Tarsi plumosi.

In proposing the characters of this genus, I wish them to be considered more as indicating a group, by which the genus *Treron*, Vieill. (*Vinago*, Cuvier,) may be united to the naked-legged Pigeons, than as being so rigidly framed as to exclude all other species which do not strictly present the same structure. It is quite evident, from consulting the excellent figures of MM. Le Vaillant and Temminck, that there are a number of Pigeons found both in India and Australasia, which have the feathered tarsi of *Treron*, accompanied by the slender bill of the other *Columbidæ*, and thereby clearly indicate an intervening group: yet among these birds there is a material difference in the construction of their quill feathers. In the *Columba magnifica*, for instance, the first quill is equal in *breadth* to any of the others, and thus assimilates, probably, to that structure which belongs to *Treron*;* while, in the bird we are about to describe, this quill is suddenly narrowed, and resembles the blade of an obtuse penknife. This singular formation, however, I have detected in several of the naked-legged Pigeons, such as the *C. striata*, Lath., and the *C. humeralis* of Temminck, two birds from Australasia in the Linnean Society's collection; and likewise in two other species from Brazil, now before me. This character consequently will not be peculiar to *Ptilinopus*; but when coupled with the feathered tarsi and slender bill, may indicate a group to which the *Columba monacha* of Temminck (Pl. Col. liv. 43. pl. 253), and the *Colombe porphyre* (Pl. Col. pl. 106) most probably belong.†

* I say *probably*, because I have not, at this moment, the means of ascertaining the fact. Mr. Vigors is in possession of several specimens of this group, which he assures me have no peculiarity in the shape of first quill feather.

† Judging from the description of authors, the *Columba maculata*, Lath., and the *Col. viridis*, Linn., appear referable to *Ptilinopus*.

The *Columba magnifica* may thus form the type of a subordinate section, more closely approaching to *Treron*; while the narrow-quill feather of *Ptilinopus* may serve to conduct us to the naked-legged Pigeons.

PTILINOPUS purpuratus. (Var. Regina.)

Columba purpurata? Lath. Gen. Syn. 4. 626.

Colombe kurukuru? Tem. Fig. p. 280.

P. viridis, vertice purpureo-roseo margine semi-lunari aureo; fasciâ latâ abdominali aurantiacâ; tegminibus inferioribus flavis; pennis colli rigidis apice furcatis.

Green; crown, rosy purple with a semilunar margin of golden-yellow; band on the body orange; under tail coverts yellow; feathers on the breast rigid, the tips forked.

I shall first accurately describe two specimens of this most lovely bird, sent to Mr. Brogden; and then make some observations as to its identity with the *Columba purpurata* of authors.

Total length about nine inches.* The upper plumage is of a beautiful parrot-green, inclining to yellowish; the green on the wings is deeper and more brilliant, having a rich glossy appearance: the greater coverts and lesser quills are margined by a narrow edging of buff-yellow. The crown and fore part of the head is covered by a patch of a beautiful rose-lilac colour, and bordered behind by a narrow line of golden-yellow; this line commences on each side of the mouth, and forms a semicircle on the crown. The chin, and half way down the throat, is pale yellow. The occiput, sides of the head, and tips of the neck-feathers, are of a pale and delicate cinereous. The feathers on the breast are pale green, but tipped with cinereous; these feathers have also a peculiar formation, each being forked in such a way, as to give the appearance of half the shaft, with its lateral radii, having been broken off. Immediately beyond the breast the colour is pale green, and the feathers become tinged with a spot of delicate lilac, which covers a small space in the middle of the body, and en-

* It is very difficult to give, with exactness, the total length of any bird after it has been stuffed; so much depending upon the degree of extension or contraction which the skin undergoes by that process.

croaches upon a rich orange transverse band which graduates into the pure yellow of the vent. The under tail coverts are orange; and the flanks and tarsi olive-green. The tail is even, the two middle feathers rather shorter and entirely green; the rest are green only on their outer webs and black within; but all are crossed at their extremities by a broad band of buff-coloured yellow. The greater quills are blackish, but their outer webs are dull green, with a very narrow margin of yellow. Tarsi covered with soft and thick-set feathers down to the divisions of the claws; the soles are broad and flat.

Female, or young bird.

The principal difference between this specimen and the last described, is the absence of the ruby-coloured crown; the situation of which is only indicated by a spot of dull lilac in front of the head; while the yellow line, instead of encircling the crown, is merely seen near the eye: the green on the wings is not so brilliant, nor of so blue a tinge as in the male; while the tail-feathers are only *marginèd round* their tips with pale yellow: the extremities of the greater quills are also marginèd with white; the orange on the abdomen is duller, and mixed up with yellow, and the green base of the feathers in this part more distinctly seen.

Both these specimens are among Mr. Brogden's birds, and are supposed to come from Australasia.

On comparing the above descriptions with those of the *Columba purpurata*, by M. Temminck and Dr. Latham, several variations will be observed; these, for the sake of brevity, may be thus noticed:

| | |
|--|--|
| <i>Ptilinopus purpuratus</i> (var. ?
regina). Mihi. | <i>Columba purpurata</i> . Latham
and Temminck. |
|--|--|

- | | |
|---|--|
| 1. Tarsi covered with olive-green feathers as far as the division of the claws. | 1. Les tarses sont à moitié emplumés. Temminck. The legs are very <i>rough</i> ,* and of a dusky black. Lath. Gen. Synopsis. |
|---|--|

* This is a very ambiguous expression; a foot may be either *rough* with scales, or *rough* with unconnected feathers. In our bird the feathers are short, small, close-set, and very smooth.

- | | |
|--|--|
| 2. Middle of the body with a purple spot. | 2. Not alluded to. |
| 3. Tail feathers rounded at their extremities. | 3. All the tail feathers somewhat pointed at the end.—Lath. |
| 4. Ends of the tail feathers banded with buff-coloured yellow. | 4. L'extrémité de toutes les pennes est d'un blanc nuancé de vert. |
| 5. Chin, and part of the throat, straw colour. | 5. Not alluded to. |

The only material difference between these two birds consists in the tarsi of one being entirely covered with feathers, and those of the other but partially; there seems also a slight variation in the form of the tail feathers. I do not lay much stress upon the dissimilarity of their colours, because it appears that the *Col. purpurata* of authors is subject to much variation of plumage. Future observations will shew whether there may not be one or two distinct species confounded under this name. All those birds which I have mentioned as likely to come into the group of *Ptilinopus*, have their general plumage green, variegated by the most beautiful colours; they are the inhabitants of India, and the Islands of the Pacific Ocean. Their tails are either even or rounded, while the variation in the form of their quill feathers has been already noticed.

Genus. SERICULUS. Mihi.

- | | |
|--------------------------------------|---------------------------|
| <i>Rostrum Orioli rostro simile.</i> | Bill of Oriolus. |
| <i>Tarsi elongati, validi.</i> | Tarsi lengthened, strong. |
| <i>Cauda subfurcata.</i> | Tail slightly forked. |

Two specimens of this rare and superb bird are among those in Mr. Brogden's collection. As a species, it has long been known by the excellent figure of Lewin; yet as its situation in Nature calls for much enquiry, I avail myself of this opportunity to offer a few remarks upon the subject.

That *Sericulus* presents a type of form, totally distinct from

all other known birds,* cannot I think be questioned; it has the bill of a frugivorous bird, without even the slightest indication of those weak bristles or hairs which, in the Thrushes, are situated on each side the rictus. The size and shape of its bill, in fact, is that of a genuine Oriole; the resemblance extends to the *nares*, and even to the proportional length of the wings and quill feathers: but the tarsi put on quite a distinct form; and by their lengthened, robust structure, give us every reason to suppose that the habits of the bird assimilate to those of the *Merulidæ* which seek their food, not only among trees, but upon the ground. We are struck by another anomaly in the tail, which, unlike that of any birds in the two last mentioned groups, is slightly though distinctly forked; this structure we generally find is indicative of a superiority of flight; and is quite unknown to me in any species of *Oriolus*, *Turdus*, or *Meliphaga*.

From a consideration of the above characters, and arguing from theory, I should therefore say that *Sericulus* would indicate that passage between the true Orioles and the *Merulidæ*, which at present appears undiscovered; and that its habits and economy may consequently assimilate to both these groups.

But against this theory, there is at present a strong, and apparently an insurmountable objection. For this very bird has been described as *nectiferous*, in other words, as deriving its sustenance from flowers; and this fact is implied by the name it has received from a Naturalist who lived in its native country, and certainly had the best opportunity of ascertaining the truth. Lewin, who founded the genus *Meliphaga*, describes this as the first species, by the name of *King Honeysucker*. Yet so little does it accord in outward structure, even in one solitary instance, with those birds, that I hope not to be considered too sceptical if I withhold my belief from testimony apparently so conclusive. Besides, it must be remembered that Lewin says nothing *expressly* about its manners or mode of feeding; and that although in many instances an accurate observer, he might err on this

* I must here except the *Paradisca aurea* of Latham, placed by Linnaeus among the Orioles, and which seems from the description of authors, closely allied to *Sericulus*.

point, and suppose that while the bird was feeding upon *fruits*, it was sucking *flowers*. Yet it is useless to argue from conjectures. All we can say is, that if *Sericulus* belongs to the circle of *Meliphagidæ*, it presents a most singular deviation from the general structure of all those birds which are known to be nectiferous. I hope some naturalist of that distant region where it is found, will throw some light on this important question; by sending home a specimen of the bird in spirits, accompanied by details on its natural economy. Until this is done the question must remain undecided.

SERICULUS chrysocephalus.

S. niger : *cervice, remigibusque secundariis aureis.*

Black; crown, upper part of the neck and lesser quill feathers golden yellow.

King Honey sucker, Lewin's Birds of New Holland, Pl. 1.

Size of a thrush. Length nine inches. Bill three quarters of an inch long, from the frontal feathers to the tip; rather strong; the sides compressed, but the base broader than high; the culmen is elevated, and gradually curved nearly its whole length: the upper mandible projects over the lower, and has the tip obtuse; the ends of both are notched; the colour is pale, or yellowish brown. The nostrils large, basal, and entirely naked; the upper part is covered by a thin membrane, and the under part forms an oval aperture. Front, crown, and upper part of the neck, covered by soft, close-set feathers, of a brilliant golden yellow; those on the head very short, and resembling velvet: this patch of colour borders the ears, and terminates in a half collar round the back of the neck. On the wing, is also a large spot of pure yellow, which covers the scapulars, and leaves only a black tip to the lesser quills; the greater quills, (except the two outermost) are black, with the half of the inner webs, (nearest the shafts,) yellow. All the rest of the plumage, (including the ear feathers, and a stripe over the eye,) is deep black; the tail is slightly, but decidedly forked; the middle feathers being three-tenths of an inch shorter than the outer pair. Tarsi black, lengthened, and robust; the hind claw although strong, is considerably shorter

than the middle claw, a structure which seems to me at total variance with all those *Meliphagidæ* with which I am acquainted. The anterior toes are long and slender, the outer connected to the middle toe as far as the first joint, but the inner deeply cleft to its base.

Dimensions.—Length of the wings 5 inches; tail 3; tarsi $1\frac{3}{4}$; middle anterior toe $1\frac{1}{4}$; hind toe $\frac{3}{4}$.

Genus. *PTILORIS*. Mihi.

Tribe. Tenuirostres.*

Family. *Meliphagidæ*. Vigors. Mihi.

GENERIC CHARACTERS.

Rostrum longissimum, compressum, falciforme.

Nares basales, plumosi, aperturâ lineari.

Tarsi breves. Hallux validus. Tarsus halluxque æquales, plantæ planæ, latæ.

Cauda brevis, æqualis.

Alæ rotundatæ.

Bill very long, compressed, sickle-shaped.

Nostrils basal, plumed; aperture linear.

Tarsi short, hallux strong, and as long as the tarsus. Soles of the feet flat, dilated.

Tail short, even.

Wings rounded.

Independently of the magnificent plumage which adorns this bird, it is one of those whose peculiar structure, at first sight, seems to disturb all our artificial systems, and speculative theories. In its form are united the characters of three distinct families. The metallic brilliancy of its plumage, first leads us to think it a Paradise bird,—a glance at its long curved bill immediately reminds us of *Promerops*,—until, looking more closely to the feet, we discover, in its strong *hallux*, the complete structure of

* The five families of this Tribe, I conceive, will be represented by the following Genera: 1. *Meliphaga*, Lewin; 2. *Nectarinia*, Illiger; 3. *Trochilus*, Linn.; 4. *Promerops*, Brisson; 5. *Paradisea*, Linn.

the *Meliphagidæ*. This character is so important, and apparently so connected with the natural economy of the Australasian nectiferous birds, that it is necessary to make a few observations upon it in this place; particularly as it goes more to decide the situation of *Ptiloris* than any other indication I can discover. The Australasian *Meliphagidæ*, with the exception of one type,* derive their principal sustenance, as it is well known, from the nectar of flowers: but the shortness of their wings renders it impossible that their food can be thus extracted during flight, as in the case of the Humming birds. They must therefore hop or climb among the branches; and, while feeding, must generally be in a semi-perpendicular position.† As a support to them in this attitude, we accordingly find that the hind toe is remarkably strong, and so much prolonged, as to give the foot an appearance of being scansorial. Now as this character pervades the whole of the *Meliphagidæ*, and is very conspicuous in *Ptiloris*, I consider it as a sufficient indication of the family in which we should place this bird.

An inquiry into the precise situation of *Ptiloris* among the *Meliphagidæ*, would extend the limits of this paper too much; and will be more suited for those general considerations on the *Tenuirostres* which I hope, ere long, to submit to Naturalists. I shall therefore merely observe, that while this genus seems to open a passage to the next family of *Paradiseidæ*, it gives a typical representation of that group among the *Meliphagidæ*.

* *Entomyzon*, (Mihi). The blue-faced Grakle of Latham, whose filamentous tongue is used for extracting small insects from between the broken bark on the stems of trees; which are climbed by this bird somewhat in the same manner as a Woodpecker. See *Lewin's Birds of New Holland*. A more beautiful connection between the *Scansores* and the *Tenuirostres* could hardly be imagined.

† This I infer, from the circumstance that all the Nectiferous birds I have seen in a state of nature, rarely, if ever, bend their head *downward* while in the act of feeding. This is particularly observable in the Humming birds; who, before they thrust their tongue into a flower, always get rather *below* it, bending their head *upwards*, while hovering on the wing and sucking the juices. This attitude is admirably represented in Wilson's inimitable figure of *Trochilus colubris*. Am. Orn. vol. 2. pl. 10.

We must here notice the *Epimague proméfil* of M. Cuvier,* which presents a strong resemblance, in many respects, to *Ptiloris*. This bird I had the opportunity of seeing and describing before the dispersion of Mr. Bullock's collection, when it was secured for the French Museum. The legs of this specimen were unfortunately wanting, and were doubtless imperfect in that described by M. Cuvier. Until their structure can be examined, it will be impossible to decide whether this bird belongs to the *Promeropidæ* or to the *Meliphagidæ*. For the present, I concur with M. Cuvier in placing it among the former; considering it may connect, (in conjunction with the Grand Promerops of New Guinea) the family of *Promeropidæ* with that of *Paradiseidæ*, which latter again passes into the *Meliphagidæ* by means of *Ptiloris*.

Having now endeavoured to ascertain the station which this extraordinary bird holds in Nature, it only remains for me to give the characters by which it may be known as a species.

PTILORIS paradiseus.

P. supra nitidè atro-purpureus, infra nitidè atro-viridis; vertice jugulo rectricibusque mediis splendidè cæruleo-viridibus.

Black, glossed with purple above and green beneath; crown, throat, and two middle tail feathers splendid blue-green.

MALE.

It is impossible for any written description, or coloured representation, to convey an adequate idea of the rich and varied tints of this superb creature. Its size is about that of the six shafted Paradise bird, and its general colour is a deep velvet black, glossed on the upper parts with rich brownish lilac, which in some lights, leaves the margin of each feather black, and gives them a scale-like appearance; this gloss is very rich on the scapular quills, but is only seen on the outer sides of the greater quill feathers. The whole upper part of the head is covered by a crown of small scale-like feathers, of a splendid metallic blue-

* Règne Animal, Tom. I, p. 408; Pl. 4, f, 2,

green ; each colour alternately preponderating as the direction of the light is varied. The middle of the *throat* is occupied by a large patch of the same colour, which, as it approaches the breast, divides, and forms a stripe on each side. The *chin* and *breast* appear to be of an intense velvety black ; but, when held in certain lights, become glossed with the most beautiful reflections of lilac and purple. The feathers on the *body* are yet more changeable ; in some directions they seem entirely black, in others they appear black, margined by a rich olive green ; while in another position, the black centre of each feather is glossed by brilliant reflections of lilac and purple intermixed, and relieved by a narrow line of bright green bordering the duller hue of the margins. The feathers on the *flanks* are the same, and much lengthened. The side feathers of the body are black and very long, being nearly as much developed as those of *Paradisæa sexsetacea*.

The *wings* are black and glossy, and although not long, the quills are remarkably broad, yet so abruptly truncated that the *greater quills* hardly exceed the lesser ones in length. The shafts of all, except those nearest the body, end in a lengthened pointed hair, extending beyond the radii: the first quill is half as long as the second, and is pointed ; the second is but slightly pointed, and is scarcely shorter than the third.

The *tail* is short, fasciculated, somewhat concave, and even ; each feather is abruptly truncated, and has the shaft terminated in the same manner as those of the quills : the colour of the lateral feathers are deep black ; but the middle pair are of a shining metallic green-blue, and half an inch shorter than the others. The *bill* is black, and considerably compressed from its base, having towards the tip of the upper mandible an appearance of a notch. This character is common to the *Meliphagidæ* and *Paradisæidæ*, but is entirely wanting among all the *Promeropidæ* I have hitherto seen. In this sex the *nostrils* are completely hid by the frontal feathers, which entirely cover the membrane.

The *legs* are very short, and the knees concealed by feathers ; the lateral scales of the tarsi are entire. The size of the three fore *claws* are equal ; but the hind claw is considerably stronger.

Dimensions.

| | In. |
|---|------------------|
| Total length..... | 12 |
| Bill in a strait line from the rictus to the tip .. | 2 $\frac{2}{10}$ |
| Wings..... | 6 |
| Breadth of the lesser quills | 1 $\frac{3}{4}$ |
| Tail | 3 $\frac{1}{2}$ |
| Tarsi..... | 1 $\frac{2}{8}$ |
| Hallux and claw, in a strait line..... | 1 $\frac{2}{8}$ |
| Middle toe.....ditto..... | 1 $\frac{2}{8}$ |

FEMALE.

The contrast of colour between this sex and that we have just described, is particularly striking. While the male is adorned with the refulgent splendour, and singular developement of plumage belonging to the Paradise birds, the female is clothed in the homely and "russet brown" attire of the Scansorial and Meliphagous tribes; as if nature intended to shew us in what manner all these groups were connected. There are many curious circumstances attending the colour of certain families, particularly as affecting their geographic distribution, which have long convinced me that this subject deserves much greater attention than it has hitherto received. In the present case the female bird is partly coloured like a *Dendrocolaptes*, a *Picus*, and a *Meliphaga*. The upper parts of the plumage are greyish brown, the quills and tail edged with ferruginous. The head and its sides are blackish, and each feather marked by a whitish line down the middle of the shaft. Thus far we have a disposition of colours universal among the *Dendrocolaptes*. The ear feathers are like those of the head, but are bordered above by a stripe of white which begins behind the eye, a circumstance very general among the *Meliphagidæ*, but of which I know no instance in *Dendrocolaptes*. Lastly, the under plumage is that of a Woodpecker, the ground colour is whitish, tinged on the breast and body with ferruginous, each feather being marked by a transverse angulated line of black, resembling the head of a broad arrow. The side feathers, (so

much developed in the male,) in this sex are of the ordinary length, so also is the breadth of the lesser quills; but the length of the bill exceeds that of the male by one eighth of an inch. In this specimen there is a slight difference also in the comparative length of the quill feathers: the third being in a very slight degree shorter than the fourth and fifth.

Although this bird is not absolutely labelled as the *female*, yet I have no doubt whatever of such being the case.

ART. LXI. *Observations on the Manners of a live Toucan, now exhibited in this Country. By W. J. BRODERIP, Esq. F. L. S.*

[To the Editors of the Zoological Journal, 17th Dec. 1824.]

GENTLEMEN,

I SHOULD hardly consider the following trifle worthy of insertion in your Journal, were it not for the interest which is attached to any memoir illustrative of the habits of animals, and more particularly of those whose geographical distribution renders them comparatively inaccessible.

There are, perhaps, few matters of this kind which have so much excited the attention, and baffled the investigation of Naturalists, as the habits and food of the Toucans. It appears that Linnæus had reason to believe that some of these birds partook of animal food, for he called one of the species *Piscivorus*; and, accordingly, met with the censure which too many are apt to lavish on those who venture to broach any thing which gives a shock to preconceived opinions.

My friend Mr. Swainson, who has seen these birds in their native forests, and has since paid great attention to the species, long ago told me that he had frequently watched them; and remarked that they always perched on the summits of lofty trees, where they would remain as if *watching*. This circumstance, joined to others connected with the remains of food found in the stomach of such

as were dissected, induced Mr. S. to suspect that the Toucans were partly carnivorous, feeding upon eggs and young birds, as well as fruits and berries; and that while perched upon these lofty trees, they were in fact busily employed in watching the departure of parent-birds from their nests. He never could catch them in the fact, nor did any thing appear upon his numerous dissections, to enable him to determine, with any degree of certainty, on what they fed. Mr. Such, who has lately come from Brazil, who has improved his excellent opportunities by a spirit of inquiry and industry, and has brought with him, as their results, a very rich addition to the fund of Ornithological materials, has informed me that he has seen these birds feed on the Toucan-berry, that he has observed them frequently engaged in quarrels with the monkies, and that he is certain that they also feed on eggs, nestlings, &c. On the 23rd Nov., Mr. Vigors, at the Zoological Club, in the course of explaining some of the affinities and analogies of which he is daily giving us such beautiful illustrations, spoke of a living Toucan, which was then, and is still, exhibited, with many other curious animals,* at No. 42, St. Martin's Lane. He stated that the bird had been fed on a vegetable diet; but that the proprietor had told him, that on the occasion of a young Canary bird having escaped and gone near to the Toucan, the latter appeared more than usually excited, that thereupon the barrier between them was removed, and that the Toucan instantly seized and devoured the Canary bird.

The next day I went to the place in question, and saw the Toucan;—but here I must observe, that it is not my intention to enter into any specific description of the bird, or to advert to the importance of what I beheld as an Ornithological fact;—I shall leave those departments to pens more capable of doing justice to them. I may be, perhaps, allowed to say, that from the rough account and sketch which I sent to Mr. Swainson, (for I do not profess to be an Ornithologist,) he is of opinion that the bird may be undescribed; and that he hopes shortly to visit London and examine it himself. Should his supposition be correct, its characters will be recorded, most probably, in the pages of this Journal.

* Among them are several live Birds, Snakes, Alligators, &c.

For the rest, I shall content myself with a simple narrative of what I saw.

After looking at the bird, which was the object of my visit, and which was apparently in the highest state of health, I asked the proprietor to bring up a little bird, that I might see how the Toucan would be affected by its appearance. The proprietor soon returned, bringing with him a Goldfinch, a last year's bird. The instant he introduced his hand with the Goldfinch into the cage of the Toucan, the latter, which was on a perch, snatched it with his bill. The poor little bird had only time to utter a short weak cry ; for, within a second, it was dead, killed by compression on the sternum and abdomen, and that so powerful that the bowels were protruded after a very few squeezes of the Toucan's bill. As soon as the Goldfinch was dead, the Toucan hopped with it still in his bill to another perch, and placing it with his bill between his right foot and the perch, began to strip off the feathers with his bill. When he had plucked away most of them, he broke the bones of the wings and legs (still holding the little bird in the same position) with his bill, taking the limbs therein, and giving at the same time a strong lateral wrench. He continued this work with great dexterity till he had almost reduced the bird to a shapeless mass ; and, ever and anon, he would take his prey from the perch in his bill, and hop from perch to perch, making at the same time a peculiar hollow clattering noise, at which times I observed that his bill and wings were affected with a vibratory or shivering motion, though the latter were not expanded. He would then return the bird to the perch with his bill and set his foot on it. He first ate the viscera and continued pulling off and swallowing piece after piece, till the head, neck, and part of the back and sternum with their soft parts were alone left : these, after a little more wrenching, while they were held on the perch, and mastication, as it were, while they were held in the bill, he at last swallowed, not even leaving the beak or legs of his prey. The last part gave him the most trouble ; but it was clear to me that he felt great enjoyment ; for, whenever he raised his prey from the perch, he appeared to exult, now masticating the morsel with his toothed bill, and applying his tongue to it, now attempting to gorge

it, and now making the peculiar clattering noise accompanied by the shivering motion above-mentioned. The whole operation, from the time of seizing his prey to that of devouring the last morsel, lasted about a quarter of an hour. He then cleaned his bill from the feathers, by rubbing it against the perches and bars of his cage. While on this part of the subject, it may be as well to mention another fact, which appears to me not unworthy of notice. I have, more than once, seen him return his food sometime after he had taken it from his crop, and, after masticating the morsel a while in his bill, again swallow it; the whole operation, particularly the return of the food to the bill, bearing a strong resemblance to the analogous action in the ruminating animals. The food, on which I saw him so employed, was a piece of beef, which had, evidently, been macerated sometime in the crop. While masticating it, he made the same hollow clattering noise as he made over the remains of the Goldfinch. Previous to this operation, he had examined his feeding trough, in which there was nothing but bread, which I saw him take up and reject; and it appeared to me, that he was thus reduced from necessity to the above mode of solacing his palate with animal food. His food consists of bread, boiled vegetables, eggs and flesh; to which a little bird is now added, about every second or third day. He shows a decided preference for animal food, picking out all morsels of that description, and not resorting to the vegetable diet till all of the former is exhausted.

The season has prevented the proprietor from introducing into the cage, the nests of small birds, with their contents, and from placing in the pan of water, in which the Toucan delights to wash himself, gudgeons and other small fresh-water fish. It is submitted, however, that enough has been stated, to show, that the Toucan is omnivorous, to justify the strong suspicions entertained on the subject by Mr. Swainson, and to corroborate the observations of Mr. Such.

It is said that the nerves are very much expanded within the internal surface of the bill in these birds; and, independently of the sensual enjoyment, which the Toucan above-mentioned appeared to derive from palating his prey, (if I may use such an expression,)

I have observed him frequently scratching his bill with his foot, which may be considered as furnishing additional evidence of the sensibility of this organ. While taking his prey, he never used his foot for the purpose of conveying it either to his bill or elsewhere. The bill was the sole vehicle, and the organ actively employed: the foot merely confined the prey on the perch.

But there is yet another of the peculiarities of this bird, which must not be passed over in silence. When he settles himself on his roost, he sits a short time with his tail retroverted, so as to make an acute angle with the line of his back; he then turns his bill over his right shoulder, nestling it in the soft plumage of his back, (on which last the under mandible rests,) till the bill is so entirely covered that no trace of it is visible. When disturbed, he did not drop his tail, but almost immediately returned his bill to the comfortable nidus from which, on being disturbed, he had withdrawn it. He broke, a short time ago, some of his tail feathers, and the proprietor informed me, that before that accident, the bird, when at roost, retroverted his tail so entirely, that the upper surface of the tail feathers lay flat over, and came in contact with the plumage of the back; so that the bird bore the appearance of a ball of feathers, to which, indeed, when I saw him at rest, *after* his accident, he bore a very considerable resemblance. The proprietor informs me that he always roosts in the same way.

I cannot conclude this memoir, without bearing testimony to the very great civility and attention of the possessor of the bird, which has furnished the subject of it, and recommending his little menagerie to the attention of the curious.

I have the honour to be, &c.

W. J. BRODERIP.

ART. LXII. *Monograph on the Cypræidæ, a Family of Testaceous Mollusca*. By JOHN EDWARD GRAY, Esq. M.G.S.

[Continued from page 391.]

56. *Cypræa lentiginosa*.—The Freckled Cowry.

Testa ovata, albida, obscure interrupte trifasciata, punctulis fulvis sparsis nebulata, basi albâ; marginibus incrassatis, albis, punctulis numerosis nigris ornatis; dentibus magnis subæqualibus.

Icon. *Zool. Journal*, t. 7. f. 1. t. 12. f. 1.

Mus. Brit. Dom. Children, Nost.

Shell ovate, white, with three obscure purplish interrupted bands, the central one of which is broad, and formed of waved cross lines, and the other two narrow; the back scattered with numerous distinct variously sized fulvous specks; the spire concave, nearly covered; the base convex white, with scattered minute black specks near the edge. The margin thickened, rounded, with numerous minute black specks, and a black spot on each side of the anterior extremity, and one on the spire; the mouth is rather wide; the teeth large, nearly equal; collumella flat, plaited; inside purplish-white. Axis $\frac{13}{10}$, diameter $\frac{8}{10}$ of an inch.

When worn, the shell is purplish-white, with the three bands more distinctly visible.

This is a most beautiful and distinct species, and all the specimens which I have seen come out of old cabinets, so that I have not the slightest idea of its habitat, nor does it appear now to be brought to this country or to be known in France.

57. *Cypræa Humphreysii*.

Testa ovato-oblonga, umbilicata, albido-cærulea, fulvo latè trifasciata punctulisque fulvo-fuscis sparsa; basi marginibusque aurantiis, nigro punctatis; dentibus subæqualibus, pallidis.

Icon. *Zool. Journal*, t. f.

Mus. Nost. Mawe.

Shell ovate oblong, milk white, with three very broad fulvous bands, making the shell appear fulvous brown, with four narrow

bluish white bands, one of which is round the concavity of the spire, and another round the anterior extremity, scattered with numerous irregularly shaped fulvous brown spots, the spire concave, partly covered; the base flat, orange yellow, spotted; the margin slightly thickened, scarcely extended, and sharply margined on the outer lip, and sides of the front; extremity orange yellow, scattered with brown specks, the aperture rather narrow. Teeth rather large, blunt, pale; the columella flat, smooth, in the hind part plaited, and rather concave in the front. Axis $\frac{2}{10}$, diameter $\frac{5}{10}$ of an inch.

I am indebted to the kindness of Mrs. Mawe for this beautiful, and very distinct species of Cowry, which I have named after Mr. George Humphreys, who may be considered as the father of modern Conchologists, and who anticipated the French Conchologist in many points of their arrangement.

58. *Cypræa cruenta*.—The Blood-spot Cowry.

Testa ovata, oblonga, subumbilicata, albida, punctulis confertis fulvis et maculis albidis nebulata; marginibus incrassatis, gibbosis, albis, purpureo-guttatis; rimâ aurantiâ; labro subtus sulcato.

Cypræa cruenta. Gmelin 3420. ! Dillwyn R. S. 461.

"*Cypræa Morbillosa*. Solander's Mss." Dillwyn.

Cypræa Caurica, Var. Gmelin, 3415. Schreiber's Conch. j. 122.

Cypræa Variolaria. Lamarck. Ann. Mus. xvi. 91 ! Hist. vii. 387.

Cypræa, n. 30. Schroeter Einl. j. 142.

Icon. Rumphius. t. 38. f. O. Petiver Amb. t. 8, f. 8. Gaultier, t. 15, f. E. Favanne, t. 30, f. E. 3. Martini j. t. 29, f. 30. Encyc. Method, t. 353, f. 2 !

2. *Incompleta*. Testa oblonga subcylindrica, marginibus subincrassatis roseo-guttatis.

Inhabits Indian Ocean. Lamarck. Amboyna. Rumphius. Mus. Brit. Nost.

Shell ovate oblong, white, back covered with a coat formed of minute fulvous specks, leaving round white holes; spire concave, partly covered; base convex, white; margin thickened, rounded,

tumid, rather irregular, white, with scattered largish round purple spots. The mouth wide, orange colour; teeth white, those of the inner lip small, close, nearly equal; of the outer lip large, distant, extended over the lip nearly to the margin, forming prominent ribs; columella flattish, front parts deep, plaited; inside purplish white. Axis $\frac{42}{10}$, diameter $\frac{8}{10}$ of an inch.

When this beautiful species is young, the shell is nearly cylindrical, for the margin is scarcely thickened, and the spots are paler; but it is even then soon distinguished by its mouth and back.

59. *Cypræa caurica*.

Testa ovato-oblonga, subumbilicata, albida, obscure trifasciata, punctulis fulvis nebulata; marginibus incrassatis, nodulosis, rufescentibus fusco-guttatis; rimâ aurantio-fuscâ; dentibus albis; labro subtus sulcâto.

Cypræa caurica. *Lin. Syst. Nat.* 1179! (1) *Martini*, f. 375. *Born. Mus.* 188. *Schroet. Einl.* j. 122. *Gmelin.* 3415. *Schreiber's Conch.* j. 73. *Lamarck Ann. Mus.* xvi. 93, *Hist.* vii. 390. *Dillwyn. R. S.* 460.

Icon. Lister Conch. t. 610, f. 37! *Rumphius.* t. 38. f. P. (1) *Pet. Amb.* t. 16. f. 8. *Favanne*, t. 30, f. E. 1. *Martini j.* t. 29. f. 301, 302.

2. *Incompleta*. Testa subcylindrico-oblonga, marginibus subincrassatis, lævibus.

Cypræa Stolidæ. *Martini j.* 327. *Schroeter Einl.* j. 125. *Gmelin* 3416. *Schreiber's Conch.* 77.

Cypræa Dracæna *Born. Mus.* 189! *Dillwyn R. S.* 460!

Cypræa corrosa. *Gronovius Zooph.* 291. (2)

Cypræa derosæ. *Gmelin* 3416. (2)

Icon. Lister t. 677, f. 24! *Rumph. Amb.* t. 39, f. E. *Petivier's Amb.* t. 16, f. 10. *Seba Mus.* iii. t. 55, f. 12. 14. *Martini j.* t. 28. f. 292, 293. *Gronovius Zooph.* t. 18. f. 10. (2) *Ency. Method.* 356. f. 10. *Born. Mus.* t. 8, f. 12.

3. *Decorticata*. Testa subcylindrica, albido-cærulea, interrupte trifasciata, marginibus subincrassatis, carneis, nigro-maculatis.

Cypræa stolidæ. α . γ . *Gmelin.* 3417.

Cypræa tabescens. β. *Dillwyn*, R. S. 463.

Icon. *Lister Conch.* t. 678, f. 25. *Martini*. j. t. 28. f. 296, 297.

Inhabits, Indian Ocean, Madagascar. *Lister*. Amboyna, *Rumphius*. Mus. Brit. Nost.

Shell ovate oblong, white, with three obscure double bands; the back crowded with minute fulvous specks, and often ornamented with an irregular square brown spot in the centre; the spire concave, covered; the base convex, reddish; the margin thickened, gibbous, rounded, nodulose, reddish, spotted with largish round black spots; the mouth is wide, reddish orange; teeth whitish, those of the inner lip are small, close, extended over the lip, except those of the front part which are larger, and more distant; the teeth of the outer lip large, rather distant, extended over the lip nearly to the margin, forming prominent ribs; the columella flattish, plaited, especially in front; inside purplish white. Axis $\frac{13}{10}$, diameter $\frac{8}{10}$ of an inch.

When this common but pretty shell is young, the margin is scarcely thickened, and then it is *C. dracæna* of Born, and from its often having the square dorsal spot it is the *C. stolidæ* of most authors, but not of Linnæus. When it is worn the three articulated double bands are most distinctly exhibited on a blue ground.

60. *Cypræa moneta*.—The Money Cowry.

Testa ovata, albido-lutescens, dorso lineâ flavâ circumdato, marginibus incrassatis, supra tumidis, nodosis, subtus planulatis, tuberculatis.

Cypræa moneta. *Lin. Sys. Nat.* 1178. *Martini* j. 404. *Born. Mus.* 187. *Schroeter. Einl.* j. 120. *Gmelin* 3414. *Schreiber's Conch.* j. 72. *Lamarck Ann. Mus.* xvi. 102, *Hist.* vii. 401. *Dillwyn* R. S. 458.

Icon. *Bonanni Rec. & Kirch* iii. f. 233. *Lister. Conch.* t. 709. f. 59! *Rumphius Amb.* t. 39. f. C. *Petiver's Amb.* t. 16. f. 14, *Gaz.* t. 9768! *Gaultier* t. 14. f. 3, 4, 5. *Argenville*, t. 18. f. K. *Knorr.* iv. t. 14, f. 4. *Favanne* t. 29, f. G. *Martini* j. t. 31, f. 337, 338, (and 339 cut open.) *Born. Vign.* 73. f. c. *Encyc. Method.* t. 356, f. 3.

2 *Incompleta*. Testa ovato-oblonga, albida, obscure trifasciata ; spirâ planâ ; subtus sulcatâ.

3. *Decorticata*. Testa cærulea, marginibus albis.

Icon. *Martini* j. t. 31. f. 339.

Inhabits Mediterranean, Atlantic, Ethiopic, and Indian Seas.
Gmelini. Mus. Brit. Nost.

Shell ovate, white, or whitish yellow ; the back ovate, surrounded by a yellow ring close to the edge of the margin ; spire flat, covered ; the margin thickened and extended, but rounded at the edges, and produced at the upper part into four tubercles, which are nearly as high as the centre of the back, giving the shell the appearance of a trussed fowl, which it is often called ; the base white, flattish, with seven or eight tubercles on the side of the mouth ; mouth rather wide ; teeth rather large, and close, nearly equal on both lips ; columella flat, even ; inside white, with three purple bands. Axis $\frac{9}{10}$, diameter $\frac{7}{10}$ of an inch.

When this common shell is young, it is oblong-ovate, with a flat spire ; white, with three obscure purplish bands, and the base is flat, and the teeth are extended rib-like over the lips.

It is distinguished from the next two by the tubercles on the margin and base.

61. *Cypræa obvelata*.—The Thick-Clothed Cowry.

Testa ovata sub depressa, dorso cærulescente, lineâ flavâ circumdato ; marginibus incrassatis, albido-cinereis, lævissimis, tumidis, dorso elevationibus ; subtus convexiusculis subsulcatis.

Cypræa obvelata. *Lamarck*. *Ann. Mus.* xvi. 102. ! *Hist.* vii. 401.

Cypræa moneta. Var. *Dillwyn* R. S. 459.

Icon. *Martini* j. t. 24. f. 239, 240 ? *Zool. Journ.* t.

2. *Incompleta*. Testa dorso cærulescente, marginibus pallidè carneis, incrassatis, depressis.

β. *Vitellus*. Testa lutea polita, marginibus sub-depressis.

Inhabits Sea of New Holland. *Lamarck*. Mus. J. Sowerby.

2. Mus. Dom. M. A. *Mauger*. β. Mus. Dom. *Mawe*.

Shell ovate, rather depressed ; the back blueish white, lanceolate, surrounded by a rather broad, yellow line, placed close to the

margin; spire covered; margin very much thickened and extended, rounded at the edges, forming a kind of smooth polished wall round the back, the height of which it often exceeds, greyish white; the base white, polished, rather convex; the mouth rather broad; teeth extended partly over the base, giving it a ribbed appearance, those of the inner lip larger, distant, those of the outer smaller, closer; columella smooth; inside purple. Axis $\frac{9}{16}$, diameter $\frac{7}{10}$ of an inch.

When this shell is not quite full grown, the edge is rather depressed and it has somewhat the form of *C. annulus*; but the outline and edge are more rounded, in which state it is in the collection of my excellent friend, Mrs. M. A. Mauger. In the cabinet of Mrs. Mawe, there is two specimens, which appear by their teeth to belong to this species, of a fine deep yellow colour.

62. *Cypræa annulus*.—The Ringed Cowry.

Testa ovata, scutellata, luteo-albida, dorso lineâ flavâ irregulari circumdato; marginibus incrassatis, rotundatis, depressis, lævibus; subtus planiusculis; dentibus lævibus equalibus.

Cypræa annulus. *Lin. Sys. Nat.* 1179. *Martini* j. 336. *Born. Mus.* 187. *Schroeter Einl.* j. 121. *Gmelin* 3415. *Schreiber's Conch.* 73. *Lamarck Ann. Mus.* xvi. 121, *Hist.* vii. 402. *Dillwyn R. S.* 459.

Icon. *Bonanni. Rec. & Kirch* iii. f. 240, 241. *Rumphius*, t. 39. f. D. *Pet. Amb.* — *Gaz.* t. 668. *Gaulter* t. 14. f. 1, 2. *Knorr.* iv. t. 9, f. 4. *Martini* j. t. 24. f. 239, 240. *Ency. Method.* t. 336. f. 7.

2. *Incompleta*. Testa albida, obscure cæruleo trifasciata.

3. *Decorticata*. Testa cærulea, marginibus albis.

Inhabits Indian Seas. Amboyna. *Rumphius*. Alexandria, *Linnæus*. East Indies, *Humphreys*. Mollusca, *Lamarck*.

Shell ovate, yellowish white, or white, the back convex, surrounded with an irregular yellow line; spire concealed; margin thickened, depressed, rounded at the edge, smooth, polished, extended on each side into a slight tubercle; the base polished, flatish; the mouth is rather broad; the teeth very slightly extended over the base, nearly of equal size, those of the inner lip being only

a little smaller and closer; columella smooth; inside purplish white. Axis $\frac{10}{10}$, diameter $\frac{8}{10}$ of an inch.

Shell when young with three pale blue bands like the former, and when worn, purplish, with a white margin.

63. *Cypræa caput Serpentis*.—The Snakes-head Cowry.

Testa ovata, scutellata, albida, dorso fusco-reticulato; marginibus incrassatis, depressis, lævibus, fusco-nigricantibus; extremitatibus albo-maculatis; subtus planulatis; dentibus albidis.

Cypræa caput serpentis. *Lin. Sys. Nat.* 1175! *Martini*. j. 387. *Born. Mus.* 179. *Schroeter Einl.* 107. *Gmelin* 3406. *Schreiber's Conch.* j. 62. *Lamarck Ann. Mus.* xvi. 90. *Hist.* vii. 385. *Dillwyn R. S.* 446.

Icon. *Bonanni Rec.* iii. f. 258. *Kirch.* iii. f. 257. *Lister. Conch.* t. 702, f. 50! t. 704, f. 52! *Rumphius Amb.* t. 38. f. F. *Pet. Amb.* t. 16. f. 7. *Gaz.* t. 96. f. 9. *Gaultier* t. 15. f. O. *Adanson Senegal.* t. 5. f. G. *Knorr*, iv. t. 9, f. 3. *Favanne* t. 30. f. F. 1. *Martini* i. t. 33. 316. *Encyc. Method.* t. 354. f. 4!

2. *Incompleta*. Testa ovato-oblonga, albida, fusco-reticulata; marginibus subincrassatis, pallidis.

Cypræa reticulum. *Gmelin* 3407.

Cypræa n. 11. *Schroeter Einl.* j. 136.

Icon. *Lister. Conch.* t. 701. f. 49! *Martini*. j. t. 26. f. 259.

3. *Decorticata*. Testa albido-cærulea; marginibus fuscis; extremitatibus albido-maculatis.

Inhabits Indian Seas, Mauritius, *Lister*. Isle of Nassatella, *Rumphius*. Borneo, *Petiver*. Senegal, *Adanson*. Otaheite, *Solander*. Isle of France, *Lamarck*.

Shell ovate, shield shaped, whitish, the back covered with chesnut brown reticulations, leaving irregularly sized round white spots; the spire prominent, covered; the margin thickened, produced, depressed, smooth, of a fine blackish brown colour, with a white squarish spot at each extremity just over the slit; the base flattish, dark brown, near the margin, paler and shelving towards the mouth; the mouth rather narrow; teeth nearly equal, smallish, close, with the interspaces brown, scarcely extended over

the lips; columella smooth, flat; inside purple. Axis $\frac{12}{10}$, diameter $\frac{10}{10}$ of an inch.

When this shell is young it is ovate-oblong, as the margin is only slightly thickened, when Gmelin considered it as a distinct species; and when it is worn the back is purple or pale chesnut-brown, but it may be distinguished by the pale spot over the grooves of the aperture.

64. *Cypræa Mus*.—The Mouse Cowry.

Testa ovata, gibba, cinerea, pallida, marmorata, posteriùs sub-tuberculata, maculâque fusco-sanguinea insignatâ; lineâ dorsali albâ, guttis rufo-fuscis utroque latere seriatim pictâ; marginibus incrassatis subdepressis undulatim nebulosis; dentibus rufo-fuscis parvis.

Cypræa Mus. *Lin. Sys. Nat.* 1176! *Martini*. j. 325. *Born. Mus.* 182. *Schroeter Einl.* j. 110. *Gmelin* 3407. *Schreiber's Conch.* 63. *Lamarck Ann. Mus.* xvi. 451. *Hist.* vii. 381. *Dillwyn, R. S.* 448.

Icon. *Rumphius Amb.* t. 39, f. S. *Petiver. Amb.* t. 16. f. 4. *Argenville* t. 18. f. E. *Seba*, iii. t. 76. f. 33, 34. *Knorr.* vii. t. 12. f. 3. *Favanne* t. 30, f. A. *Martini* j. t. 23, f. 222, 223. *Ency. Method.* t. 354. f. 1.

2. *Incompleta*. Testa ovata, umbilicata, albido-cinerea, posteriùs maculâ fuscâ notata, lineis transversis flexuosis undatim, pictis; marginibus cinereis subnebulosis.

3. *Fossilis*. Testa subincolorata, cæteris priori similis.

Inhabits American and Mediterranean Seas. *Gmelin*. Coast of Carthagenâ, *Linnaeus*. Guinea, *Humphreys*. *Mus. Brit. Nost.* 3. Near Fiorenzola in Plaisantin, *Lamarck*.

Shell ovate, rather gibbous, ash-coloured, marbled with pale veins; the hind part just over the spine, when full grown, has two or three blunt tubercles, and a large dark reddish-brown spot, somewhat similar to that just over the posterior groove of *Cypræa stercoraria*; the dorsal line is pale, nearly central, with a series of dark reddish-brown spots on each side, which are not visible in the young and worn shells; the spire concave, covered; the margin is

thickened, depressed, and rather rounded on the edge, dark ash-coloured, clouded with pale lines; the base flattish, dark ash-coloured, with a pale reddish spot on the centre of the inner lip; aperture wide, especially in front, where the lips shelf inwards; teeth dark brown, of the inner lip small, blunt, distant, rarely exceeding six or eight in number, there generally being none on the centre of the lip; teeth of the outer lip small, distant; the columella smooth, front part flat; inside brownish ash-colour. Axis $\frac{17}{10}$, diameter $\frac{12}{10}$ of an inch.

This shell, which is usually called the *Leopard* or the *Bloody Stab*, has very little affinity to any described species of the genus, it resembles *C. stercoraria* in some respect, with regard to its colouring, but not in general form, or in the structure of its aperture. When young, it is ovate, rather gibbous in the centre of its back, of a pale ash-colour, ornamented with transversed waved darker lines, having in some places the appearance of three longitudinal bands formed of arrow-shaped spots; the spire is concave, and just over the posterior groove on the side of the spire is a large dark brown blotch, which is partly visible in the full grown shell; the margin is slightly thickened, pale ash-coloured, clouded with darker irregular spot.

65. *Cypræa angustata*.—The narrow Cowry.

Testa ovata, bruneo-rufescens, basi albidâ; marginibus subincrassatis, albidis, nigro-punctatis; labro suprâ marginato; columellâ concavâ, plicatâ.

Cypræa angustata. Gmelin 3421. (1.) Schreibers Conch. j. 77.

Cypræa n. 62. Schroeter Einl. j. 150.

Icon. Gaultier. t. 13, f. 22 (1). Bad. Zool. Journ. t. f.

Inhabits. New Holland.

Mus. Brit. Dom. Children. Nost.

Shell ovate, reddish brown, or rarely pale brown; the spire prominent, covered; the base convex, white; the margin slightly thickened, rounded, with small, round, black, spots; that of the inner lip rounded, only slightly extended; and that of the outer rather sharply edged, with the extremities generally dark; the aperture rather large; teeth equal, small, close; columella rather

concave, and rather deep, plaited nearly the whole length; inside pale brown. Axis $\frac{1}{10}$, diameter $\frac{7}{10}$ of an inch.

This shell has not been taken notice of by any of the French writers, although it is not uncommon in old collections. It varies, sometimes, in being of a very pale yellowish brown.

66. *Cypræa Algoensis*.—The Algoa Cowry.

Testa ovata, oblonga, carnea; punctulis fulvis adpersis, basi albidâ, sub-punctatâ; labiis incrassatis, supernè fusco-nigro-punctulatis; columellâ lævi, planâ.

Icon. *Zool. Journal*, t. f.

β. edentula. Aperturâ edentulâ.

2. *Decorticata*. Testa lutea vel luteo-fusca; marginibus albidis, suprâ sub-punctata.

Inhabits Cape of Good Hope. *Veillet*. Mus. Brit. Nost.

Shell ovate, oblong, flesh-coloured, with the back speckled with small fulvous dots; the spire flat, partly covered; the base white, convex; the margin thickened, slightly extended, rounded on the inner lip; thickened and margined, on the outer, where the upper part of it is variegated with small, round, dark brown spots, which usually run together just over the spire; the aperture rather large, extended beyond the spire; teeth small, close, slightly extended over the outer lip; the columella smooth, flat, the anterior part of the base, just by the slit, rugulose; inside pale yellowish brown. Axis $\frac{9}{10}$, Diameter $\frac{6}{10}$ of an inch.

When this shell is young, the base of the outer lip is sulcated, and the back of the shell exhibits three very obscure, broad, darker bands. The teeth of both the lips are very small, and in some otherwise perfect specimens, they are entirely wanting, and the lips are rounded. When the shell is worn, it is pale yellowish or fulvous brown.

67. *Cypræa piperita*.—The Peppered Cowry.

Testa ovato-oblonga, castanea, obscurè quadri-fasciata; basi albidâ, marginibus sub-incrassatis, albidis, fusco-punctatis; labiis suprâ marginatis; columellâ concavâ, plicatâ.

Cypræa piperita. "*Solander's Mss.*" Humphrey. Mus. Nost.

Icon. *Zool. Journal*, t. . 6.

Inhabits. New Holland. *Mawe*. Mus. Nost.

Shell ovate, oblong, pale chesnut-brown, polished, with four narrow, sometimes slightly interrupted bands, one of which is near the spire, and another in the front of the shell, and the other two about the middle of the back. The spire is slightly prominent, and partly covered; the base is convex, white, very slightly thickened on the inner lip, exhibiting the bands through it. The margin of the outer lip and extremities is slightly thickened, white, ornamented with numerous small round brown spots on the upper part, and a larger blotch over the spire, and on each side the anterior extremity. The aperture rather wide; the teeth equal, small, close; the columella deeply concave in front, and plaited the whole length; the inside purplish white. Axis $\frac{1}{10}$, diameter $\frac{6}{10}$ of an inch.

This shell is instantly distinguished from the former by its lighter colour, more cylindrical form, narrower outer lip, and the narrowed and deeper groove of the front part of the columella, as well as by its four narrow bands, which I have never seen in the other species. I have had it from several old collections under the above name, and have therefore adopted it out of courtesy, and to prevent confusion.

When worn, it is pale flesh-coloured, with the bands interrupted.

68. *Cypræa fusco-dentata*.—The Brown toothed Cowry.

Testa ovato-oblonga; sub-umbilicata; basi albidâ incrassatâ, fusco-costato-rugosâ; marginibus incrassatis; labro dentibus majoribus, distantibus, fuscis; columellâ planiusculâ, subplicata.

Icon. *Zool. Jour.* t. . f.

Inhabits. Cape of Good Hope, *Veillet*. Mus. Nost.

Shell ovate, oblong, pale? the spire rather concave, partly covered; the base convex and thickened, pale brownish white, inner side ornamented with numerous, irregular, short, pale chesnut-brown, prominent ribs, which appear to diverge from the mouth; the margin rather thickened, especially at the

extremities ; the aperture rather contracted, and extended beyond the spire ; the teeth of the outer lip large, distant, pale chesnut-brown, and extended over the lip nearly to the margin, in a rib-like form ; those of the inner lip, very indistinct and distant ; the columella flat, scarcely plaited. Axis $\frac{8}{8}$, diameter $\frac{5}{8}$ of an inch.

I have only seen decorticated specimens of this new and interesting species, but the peculiarity of its base at once determines it to be distinct from any other *Cypræa*. It certainly is very nearly allied to the *Cypræa Algoensis*, with which it agrees in the front part of the inner lip being rugose, and it also has considerable affinity to the *Cypræovula capensis*, which was brought to this country by the same person, but differs from it in the distance of the teeth of the outer lip, and in the want of its substriated back.

69. *Cypræa spadicea*.—The Chesnut Cowry.

Testâ ovato-oblonga, luteo-fusca ; dorso medio cœrulescente ; basi planiusculâ, albidâ ; marginibus incrassatis, rotundatis, suprâ albido-carneis ; dentibus crassis sub-confertis ; columellâ planâ plicatâ.

Cypræa spadicea. Swainson, *Phil. Mag.* lxi. 376. *Zool. Illus.* t. 182.

Icon. Swainson, *Zool. Illus.* t. 182.

Mus. J. Sowerby.

Shell ovate oblong, with a large irregular, bright, yellowish-brown blotch on the back, which is darker towards the edges, containing an irregular bluish blotch in its centre ; the spire is prominent, covered ; the base nearly flat, white ; the margin thickened, rounded, and slightly produced at the extremities, whitish purple on the upper part, and white beneath ; the aperture is rather narrow ; teeth of both lips rather large, nearly equal, those in front of the inner lip being very little the largest ; the columella flat, deep, and largely plaited its whole length ; inside purplish white. Axis $\frac{13}{10}$, diameter $\frac{10}{10}$ of an inch.

This peculiarly coloured species was first described by Mr. W. Swainson. Lately it has become a not very uncommon shell, whether from fresh importations or from the breaking up of the

several old cabinets which has just taken place, I am not aware. I am indebted to the kindness of Thomas Johnson, Esq. for the loan of the specimen which I have described.

*** CYPRÆÆ VERÆ.—Shell, when young, smooth, banded; when perfect, polished, smooth, edge denticulated; inner lip close to the columella, leaving scarcely any concave space; the plaits continued over the columella.

Obs. The shells of this section are instantly to be distinguished from those which I have before described, by the upper edge of their margin being more or less dentated; but they are very nearly allied to, and almost imperceptibly pass into the last section, from which they are distinguished by their smooth and polished back.

70. *Cypræa Turdus*.—The Thrush Cowry.

Testa ovata, ventricosa, turgida, albido-virescens; punctis fulvis, inæqualibus, sparsis; basi albidâ; aperturâ anticè dilatâ; marginibus incrassatis, albidis, fusco-guttatis, extremitatibus foveolatis, fuscoque lineatis.

Cypræa turdus. Lamarck, *Ann. Mus.* xvi. 95. *Hist.* vij. 392, (1).

Cypræa Vanelli Junior? Dillwyn, *R. S.* 462.

Icon. *Lister*, t. 685, f. 32. *Ency. Method*, t. 355. f. 9, (1). *Zool. Jour.* t. 7. f. 3. & t. 12. f. 3.

Inhabits Indian Ocean, Bay of Sunda, *Lister*. Persian Gulph, *Bennett*.

Shell ovate, ventricose, turgid, whitish green, ornamented with unequally sized, fulvous spots; margin thickened on both sides, spotted with brown, and foveolated on the upper part of both the extremities; the anterior end is lined with brown; base white; mouth rather large, especially at the front; teeth large, nearly similar, with the grooves slightly extended towards the edges; inside bluish white. Axis $\frac{4}{4}$, diameter $\frac{3}{4}$ of an inch.

71. *Cypræa spurca*.—The dirty Cowry.

Testa ovata, albida; punctis ocellisque flavis ornata; ocellis circulo albido circumvallatis; basi convexâ semisulcatâ; marginibus incrassatis, suprâ fusco-foveolatis.

Cypræa spurca. *Lin. Sys. Nat.* 1179? *Gmelin*, 3416. *Dillwyn*, *R. S.* 462, not *Born*.

Cypræa n. 37. *Schroeter*, *Einkl.* j. 144.

Cypræa acicularis. *Gmelin*, 3421. (1). *Schreiber's Conch.* t. 79.

Cypræa flaveola. *Lamarck*, *Ann. Mus.* xvi. 97. (1.), *Hist.* vij. 394.

Icon. Martini, j. t. 31. f. 335. (1.) *Ency. Method*, 356. f. 14.

1. *Junior*. Testa ovata, purpurascens.

Bulla Cypræa. *Lin. Sys. Nat.* 1185. not *Dillwyn*, &c.

2. *Incompleta*. Testa subglobosa albida, flavido-punctata.

Cypræa squalida. *Gmelin*, 3420. (3.)

Icon. List. Conch. t. 686. f. 33. (3.)

3. *Decortica*. Testa pallidè violacea, albido-marginata.

β . *Elliptica*. Testa ovato-elliptica.

Inhabits Mediterranean Sea, *Linnæus*. *Must. Brit. Nost.* 2. *Mus. Edwards*.

Shell ovate, white; back ornamented with yellowish fulvous spots, which are often surrounded with a whitish circle; the margin thickened on both sides, especially a little behind the centre of the shell; the upper part denticulated all round; the pits brown; the base convex, white, sometimes with a few scattered brown spots near the edge, especially on the columella side; aperture rather wide; teeth nearly similar, large, distinct, with the grooves slightly produced towards the edge; columella front very slightly concave, smoothish; inside violet purple. Axis $\frac{10}{10}$, diameter $\frac{7}{10}$ of an inch. *Var. β* . Axis $\frac{11}{10}$, diameter $\frac{6}{10}$ of an inch.

Obs. This shell differs considerably from *C. flaveola* of *Linnæus*, with which *Lamarck* has confounded it. It varies considerably in shape from oblong-elliptical, to subglobose, before the thickening of the margin is complete. *Gmelin* has confounded a young ventricose specimen with his *C. squalida*, which is young *C. Lynx*.

72. *Cypræa flaveola*.—The yellowish Cowry.

Testa oblongo-ovata, luteo-fusca, punctis ocellisque albidis

confertis ornata; ocellis pupillo fusco notatis; basi albâ convexiusculâ; marginibus subincrassatis, suprâ foveolatis, atro-fuscomaculatis; dentibus obtusis.

Cypræa flaveola. *Lin. Sys. Nat.* 1179? *Gmelin* 3416? *Dillwyn, R. S.* 462?

Icon. *Zool. Jour.* t. . f.

Decorticata. Testa dorso purpureo-albido.

Mus. Nost.

Shell oblong ovate, brownish yellow, ornamented with crowded white spots, some few of which have a small, obscure, brown pupil in their centre; base white, rather convex, and slightly margined on the outer, and on the extremities of the inner side; margin above denticulated, marked with crowded black, brown, roundish, unequally sized spots; dorsal line nearly central, simple, pale; aperture rather narrow, slightly dilated in front; teeth nearly equal, blunt, with the grooves slightly extended towards the margin; inside purplish white. Axis $\frac{7}{8}$, diameter $\frac{4}{8}$ of an inch.

When worn, purplish white.

I have only seen one perfect specimen of this shell, which appears very distinct from the former. It agrees very well with the characters of Linnæus, except that the brown spots on the margin are not obscure; I have therefore adopted the Linnean name.

73. *Cypræa gangrenosa*.—The ulcerated Cowry.

Testa ovato-oblonga, viridi-grisea, marginata, punctis ocellisque albidis sparsis; ocellis pupillo fusco notatis; basi convexiusculâ albidâ, margine suprâ denticulatâ; extremitatibus brunneis, supra bimaculatis.

Cypræa gangrenosa. “*Solander, Mss.*” *Dillwyn, R. S.* 465.

Cypræa poraria. (a.) *Martini, j.* 394. *Schroeter, Einl. j.* 148. *Gmelin, 3417. Schreiber Anch. j.* 75.

Icon. *Martini, j. t.* 30, f. 324, 325.

Inhabits Coast of China, *Humphreys*. Mus. Brit. Nost.

Shell ovate, oblong, greenish grey or yellowish brown, ornamented with crowded white spots, some of which are surrounded with a brown ring, so as to form brown eyes with white pupils; base white, margined on the outer, and on the extremities of the

inner side ; margin above denticulated, and sometimes with a few small, obscure, brown spots ; the dorsal line nearly central, simple ; the extremities yellowish brown on the inside, and with two irregular brown blotches on the upper part of each end ; aperture narrow, slightly dilated in front ; teeth close, blunt, with the grooves slightly extended ; the front ones of the inner lip largest ; columella front plaited ; inside purplish. Axis $\frac{6}{8}$, diameter $\frac{4}{8}$ of an inch.

This shell is very distinct, and to be directly distinguished by the yellow extremities, and two spots on the end of the back, in which character it agrees well with the *Dillwyn* species.

74. *Cypræa erosa*.—The eroded Cowry.

Testa oblongo - ovata, marginata, luteo-virescens, punctis albidis, ocellisque raris ornata ; marginibus incrassatis albis, maculâ quadratâ fusco-purpureâ notatis, supra fusco-lineatis ; basi albâ, costatâ.

Cypræa erosa. *Lin. Sys. Nat.* 1179! *Martini*, j. 392. *Born Mus.* 189. *Schroet. Einl.* j. 122. *Gmelin*, 3415. *Schrieber's Conch.* 73. *Lamarck, Ann. Mus.* xvi. 93! *Hist.* vij. 389! *Dillwyn, R. S.* 461.

Cypræa ferruginosa. *Gmelin*, (n. 1.)

Cypræa miliaris. *Gmelin*, 3420. (2.)

Cypræa n. 34. *Schroeter Einl.* 143. (2.)

Icon. *Lister, Conch.* t. 692. f. 39! and t. 780. f. 47. (2.) *Rumphius*, t. 39. f. A. *Pet. Amb.* t. 16. f. 12. *Gaz.* t. 97, f. 19! *Gualt.* t. 15. f. H. *Knorr.* vi. t. 20. f. 4. *Favanne*, t. 30. f. E. 2. *Martini*, j. t. 30. f. 320—321! and t. 26. f. 260. (2.) *Born, Mus.* t. 8. f. 13! *Ency. Method.* t. 355. f. 4: a. b!

β. *Inocellata*. Ocellis subnullis, lateribus sub-immaculatis.

2. *Decorticata*. Testa dorso purpureo.

Inhabits Indian Ocean, Isle of France, *Lamarck*. Mauritius, Ascension Island, *Lister*. Amboyna, *Rumphius*.

Shell, ovate, oblong, margined ; back greenish yellow, ornamented with numerous white spots, and scattered brownish eyes with white pupils ; the dorsal line impressed, greenish, nearly central ; the margin thickened, white, with a squarish brown spot

on the middle of each side, extended partly up the back, and with the upper part denticulated and lined with brown, especially on the extremities and outer side; the base white, grooved; the aperture rather large; teeth large, with the grooves of the anterior and hind ones of the inner lip, and those of the outer, extended to the margin, so as to leave raised ribs, thus rendering the edge of the base irregular; the columella plaited, inside purple. Axis $\frac{1\frac{2}{3}}$, diameter $\frac{7}{8}$ of an inch.

The spot on the side of the margin, which at once distinguishes this species, is generally brown, but it is sometimes reddish or violet, and is often only visible on the base of the shell. The eyes also vary much in regard to their number and distinctness.

75. *Cypræa ocellata*.—The eyed Cowry.

Testa ovata, ventricosa, marginata, fulva, punctis ocellisque albis confertis ornata, ocellis pupillo nigro notatis; ventri lateribusque fusco-albidis, rufo-fusco-punctatis; margine supra denticulatâ; dentibus extremitatibusque sub-brunneis.

Cypræa ocellata. *Lin. Sys. Nat.* 1180. *Martini*, j. 402. *Born Mus.* 192. *Schroeter, Einl.* j. 127. *Gmelin*, 3417. *Schreiber, Conch.* j. 75. *Lamarck, Ann. Mus.* xvi. 94. *Hist.* vij. 391. *Dillwyn, R.S.* 464,

Icon. Bonanni, Rec. iij. f. 347. *Lister Conch.* t. 696, f. 43? *Petivers Gaz.* t. 9. f. 7. *Favanne*, t. 29. f. B. 5. *Martini*, j. t. 31. f. 833, 334. *Ency. Method*, t. 355. f. 7.

ø. brunnea. Testa marginibus brunneis, fusco-punctatis.

Inhabits Indian Ocean, *Martini*. China, *Humphreys*.

Shell ovate, ventricose; back fulvous, ornamented with crowded small, white, round spots, and scattered eyes, marked with a deep black pupil; dorsal line pale, nearly central; sides and base whitish, or pale brown, with reddish brown spots; the upper edge of the margin is denticulated all round, the aperture rather wide, and the teeth about fourteen on each side, nearly similar, large, distant, with the ribs of the end ones, which extend to the margin, pale brown; the tips of the anterior end brown; columella plaited; inside purplish white. Axis $\frac{5}{8}$, diameter $\frac{6}{8}$ of an inch.

The black pupilled eyes of this shell at once distinguish it from

all the other species; but they are sometimes scarcely visible; it may, however, be known by its large and distant, nearly equal teeth; the base varies considerably in colour. I have specimens which are pure white, and others nearly fulvous brown.

76. *Cypræa Lamarckii*.—Lamarck's Cowry.

Testa ovata ventricosa, luteo-livida, punctis ocellisque albis confertis ornata; ocellis pupillo purpureo livido notatis; basi albâ lævi; marginibus incrassatis albidis, fulvo-fusco-guttatis; extremitatibus supra foveolatis, fusco-lineatis.

Cypræa n. 34. Partly. *Schroeter Einl.* j. 143.

Cypræa miliaris? Partly. *Gmelin*, 3420. (1.)

Cypræa miliaris. *Lamarck, Ann. Mus.* xvi. 91! *Hist.* vii. 317!

Icon. *Gualtier*, t. 15. G.?

β. *Inocellata*. Testa luteo-fulva, punctis maculisque albis ornata.

Icon. *Martini*, t. 30. f. 323. (1.)

Inhabits Indian Ocean, *Mus. Brit.* *Nost.* β. *Mus. Nost.*

Shell ovate; back ventricose, pale fulvous yellow, ornamented with numerous white spots and larger eyes, with a purplish pupil; the dorsal line impressed, pale greenish; the base white, smooth, nearly flat; the margin thickened on both sides, brownish white, with unequally sized, fulvous, brown spots; the upper edge of the extremities is pitted on the side, and lined with brown; the mouth is rather wide; teeth nearly similar, large, distant, and not extending into ribs towards the edge; the columella plaited, and the inside purplish. Axis $\frac{1}{8}$, diameter $\frac{8}{8}$ of an inch.

This species is very distinct from the last by the form of its teeth, and its lined extremities. It varies in not having any eyes on the back, but in being furnished in their place with large white spots; and in having a few apparently eyed spots on the sides of the extremities, which are occasioned by some of the brown spots being deposited over the white ones.

I am indebted to the kindness of my friend Mr. Edward Turner Bennet, for the loan of an exceedingly fine specimen of the type of this species, for description. The variety is not unusual.

On account of the confusion with regard to the name of *C. miliaris*, originally an ill-established species, I have been induced to name this shell after *Lamarck*, who first extricated the species of this genus from their confusion, and whose labours in other branches of Zoology cannot be too highly prized; as he is certainly the “*Zoologiæ Princeps*” of the present day.

77. *Cypræa Listeri*.—Dr. Lister's Cowry.

Testa ovata, ventricosa, luteo fulva, punctis ocellisque albidis confertis ornata; ocellis circulo fusco notatis; basi marginibusque purpureo-albidis, punctis lineâque purpureis notatis; marginibus suprâ crenulatis; labii dentibus approximatis.

Cypræa n. 34. *Schroet. Einl.* j. 143. (1.)

Cypræa Miliaris, (partly). *Gmelin*, 3420 (1.)

Cypræa erosa. Var. *Schreiber's Conch.* t. 75.

Cypræa erosa. Jun. *Dill. R. S.* 461 (1.)

Icon. *Lister*, t. 702, f. 48! (1.)

Inhabits Bengal, *Lister*. *Mus. Brit. Nost.*

Shell ovate, ventricose; the back fulvous yellow, with numerous crowded white spots, many of which are eyed, being surrounded with a brown ring; the dorsal line purplish, nearly central; the base and margin purplish white, with numerous purple spots and lines, the latter of which come from the centre of the teeth of the outer lip; the margin dentated on the upper part of the outer side and edges of the extremities; the aperture rather wide, especially in front; the teeth close; those of the outer lip large, those of the centre of the inner lip small, and those of the extremities larger, with grooves extending towards the edges; the columella flat, partly plaited. Axis $\frac{2}{8}$, diameter $\frac{5}{8}$ of an inch.

I have several specimens of this beautiful shell, and there are also two in the British Museum: it is well figured and described by *Lister*; and from this figure and that of a young *C. erosa*, *Gmelin* has established his *C. miliaris*. Although *Lister's* figure is quoted by *Lamarck* for that species, it has neither its white base nor its lined extremities. It is instantly to be distinguished from the rest of the species of this division, by its purple base and margin;

lineated outer lip and peculiar teeth, which are somewhat like those of *C. helvola* and *C. spurca*.

I have dedicated this species to the memory of the Father of English, and I may say of European Conchology, whose work is the ornament of the age in which it was published, and also forms an unfading monument of female talent and industry.

78. *Cypræa helvola*.—The bay Cowry.

Testa ovata, obtusa, fulvo-rufescens, punctis ocellisque albidis ornata; ocellis obscuris, circulis stellatis fuscis circumvallatis; extremitatibus violaceis; basi aurantiâ, sub convexâ, semisulcatâ; marginibus incrassatis, suprâ denticulatis.

Cypræa helvola. *Lin. Sys. Nat.* 1130. *Born, Mus.* 191. *Schroeter, Einl.* j. 126. *Schreiber, Conch.* j. 75. *Gmelin* 3417. *Lamarck, Ann. Mus.* xvi. 100. *Hist.* vii. 398. *Dillwyn, R. S.* 464.

Icon. List. Conch. 691. f. 38! *Rumphius*, t. 39, f. B. *Pet. Amb.* t. 16. f. 17. *Gualt*, t. 15. f. B. 13. *Knorr*, vi. t. 10, f. 6. 7. *Martini*, j. t. 30. f. 326, 327. *Ency. Method*, 356. f. 13.

3. *Decorticata*. Testa pallidè violacea; marginibus flavescens.

Inhabits Indian Ocean. Maldives, *Lister*. Amboyua, *Rumph.*

Shell ovate, blunt, reddish fulvous, ornamented with small white spots, some of which are surrounded with a brown circle, which spreads between the other spots, so as to form a kind of star; the dorsal line is slightly impressed, pale violet; the margin red-brown, thickened on both sides, and the upper part of the outer lip, and the sides of the extremities, are denticulated; the extremities pale violet; the base rather orange or deep red-brown; the aperture rather wide; the teeth large, rather close, with the grooves partly extended towards the edge, especially on the front part, where they render the margin slightly rugose; the inside violet. Axis $\frac{10}{10}$, diameter $\frac{7}{10}$ of an inch.

When this shell is worn it is pale violet, with a yellow or red-brown base, and purplish ends; the back is sometimes almost entirely deep chesnut-brown, with small white spots.

This shell, which is very common, is very easily known by its dark, spotless base, and peculiar teeth.

79. *Cypræa citrina*.—The citron-coloured Cowry.

Testa ovato-elliptica, fulva, maculis punctisque rotundis, albis, sparsis; basi lateribusque rufo-fulvis; margine exteriori incrassatâ suprâ crenulatâ; basi convexâ lævi; dentibus approxi-matis.

Icon. *Zool. Journ.* t. . f. .

Inhabits Madagascar, *Humphreys*. Mus. Nost.

Shell ovate, elliptical, fulvous, pale livid brown, ornamented with many small and largish round, whitish spots; margin thickened, orange; the upper part of the sides of the extremities denticulated; the base convex, smooth, orange; the aperture rather dilated in front; teeth pale, small, close, nearly similar, with the grooves scarcely extended; the inside violet white. Axis $\frac{8}{10}$, diameter $\frac{5}{10}$ of an inch.

For the first knowledge of this shell I am indebted to the liberality of Mrs. Mawe, who was so kind as to lend it to me, that I might describe it. She had it from the collection of Mr. Humphreys, under the name of the *Small false argus*, of *Madagascar*. I have since become possessed of a specimen, and have seen many others, all which have all been in the country for many years.

80. *Cypræa poraria*.—The dotted Cowry.

Testa oblonga, elliptica, fulva, punctis ocellisque albis ornata, ocellis circulo fusco circumvallatis; basi violaceâ albidâ, semi-sulcatâ; marginibus incrassatis, violaceis, obscurissimè purpurèo-punctatis; suprâ foveolatis; aperturâ albâ.

Cypræa poraria. *Lin. Sys. Nat.* 1180? *Born. Mus.* 192. *Lamarck, Ann. Mus.* xvi. 97! *Hist.* 395! *Dillwyn, R. S.* 465.

Cypræa poraria. β . *Gmelin*, 3417. *Schreiber, Conch.* t. 75.

Cypræa n. 1. *Schroeter, Einl.* j. 133.

Icon. *Lister, Conch.* t. 694. f. 41! *Seba.* iij. t. 55. f. 19. n. 5. *Martini, j.* t. 24. f. 237! 238. *Born, Mus.* t. 8. f. 18. *Ency. Method,* t. 356, f. 4.

Inhabits West Indian Ocean, Jamaica, *Martini*. Senegal, *Lamarck*.

Shell oblong, elliptical, fulvous brown, ornamented with many

scattered white spots and eyes, the eyes surrounded by a brownish ring; margin thickened, rounded, pale violet-coloured or purplish white, with a few obscure, small, purple spots; the upper part of the margin of the extremities denticulated; the base pale white; the aperture white, with thick lips; the teeth blunt, rather close, with the grooves slightly extended towards the edge, especially at the ends; the inside violet. Axis $\frac{19}{16}$, diameter $\frac{7}{16}$ of an inch.

This is very distinct from the next species, both in shape, colouring, and form of teeth.

81. *Cypræa albuginosa*.

Testa oblongo-ovata, fulvo-fusca, punctis ocellisque albis ornata, ocellis circulo fusco circumvallatis, basi albidâ, lævi; marginibus incrassatis violaceis, purpureo-punctatis; extremitate anteriori suprâ obscure foveolatâ.

Cypræa albuginosa. Mawe, *Catalogue*, n.

Icon. *Zool. Jour.* t. 7. f. 2. t. 12. f. 2.

Hab. California, Mawe. Mus. Nost.

Shell oblong, ovate, fulvous brown, ornamented with crowded white spots and eyes, the eyes surrounded with a bright brown ring, which is usually thicker on the lower side; margin slightly thickened on both sides, violet, spotted with a few scattered smallish purple spots; the upper part of the sides of the front end obscurely pitted; base white or rose-coloured, nearly flat; aperture rather wide; lips rather thick; teeth small, with grooves not extending towards the margin; those of the inner lip smallish; columella flat, plaited; inside violet. Axis $\frac{7}{8}$, diameter $\frac{4}{8}$ of an inch.

This beautiful shell was first mentioned in the useful elementary work above quoted, but was not described; knowing that my shell is the one intended, I have adopted the name.

82. *Cypræa eburna*.—The Ivory Cowry.

Testa oblongo-ovata, nivea; marginibus incrassatis, rotundatis; extremitate anteriori suprâ obscure foveolatâ.

Cypræa eburna. Barnes, *Ann. Lyc. Nat. Hist. N. Y.* j. 133. (September, 1824.)

Cypræa nivea. Gray. *Report Proc. Zool. Club. Zool. Jour.* i. 420. (October, 1824.)

Icon. Barnes. l. c. t. 9. f. 2.

1. *Junior*. Testa albido-plumbea.

2. *Decorticata*. Testa albido-fulva.

Inhabits China, Barnes. Pacific Ocean. Mus. Nost.

Shell oblong-ovate, snow white, the margin thickened, rounded, with the upper part of the outer side of the extremity slightly denticulated, the base rather convex, the aperture wide, especially in the anterior part; the teeth rather large, distant, nearly equal, with the grooves slightly extended towards the margin; inside brownish white; columella flat, plaited; spire conical, covered. The axis $\frac{8}{16}$, diameter $\frac{2}{8}$ of an inch.

I have had for a considerable time a specimen of this shell, which, from the two holes bored just over the outer lip, has been evidently worn as an ornament by the inhabitants of some unpolished nation. It was exhibited at the Zoological Club, under the above quoted name; but since that time, it has been described by Mr. Barnes, in the *Lyceum of Natural History** at New York; and therefore, as his description was first published, I have adopted his name.

Mr. Mawe has a young and worn specimen of this species; the former is pale livid white or stone-coloured; and the latter pale brown with a white base and margin.

C. ovulata of Lamarck is certainly not the young of this species, as supposed by Mr. Barnes.

83. *Cypræa guttata*.—The Blotched Cowry.

Testa ovata, fulva, guttulis punctisque niveis adspersa, basi albâ, rufo-flavo-venosâ, marginibus sub-incrassatis, suprâ acutis rufo-flavâ costato-striatis.

Cypræa n. 5. *Schroeter Einl.* j. 134.

* I may here remark that of the shells, which Mr. Barnes has so well described and accurately figured in the above paper, only two, the former and *Vol. Harpæ*; are undescribed. For *Cypræa maculata* is *C. Arabica*, var. of this Monograph; *Dolium dentatum* is *D. ringens* of Swainson; and *Natica Patula*, the shell described under that name by Sowerby. As there is another *N. patula* must be called by Mr. Barnes's MS. name of *N. Helicoides*.

2 M 2

and the latter I suppose to all
Polata Mexici near *Eurata*.

Cypræa guttata. Gmelin 3402. Schreiber's *Conch.* j. 58. Dillwyn, *R. S.* 444.

Icon. Gaultier. t. 16. f. 1. Martini. j. t. 25. f. 252, 253!

Inhabits.

Mus. Dom. Mawe.

Shell ovate fulvous; yellow, ornamented with many small and a few rather large white spots; base convex, whitish, lined and suffused with red. Edge whitish, slightly thickened, acutely margined on the upper part of the outer and on the ends of the inner side; aperture rather large; teeth large orange-red, with the ribs, which are continued from them passing over the base and edge, forming long filiform processes on the sides above the margin. Spire covered; columella nearly smooth, with the anterior part flattish, with three plaits. Axis 2 inches, diameter $1\frac{1}{4}$ of an inch.

For the sight of this rare, and I believe unique, shell, I am indebted to the liberality of Mr. Mawe. It was originally in the fine collection of Mr. Jennings.

**** *Cypræa Vera*.—Shell, when young, smooth-banded; when perfect, tuberculated or costato-striated, the ribs which form the teeth being expanded over the shell. Inner lip distant from the columella, leaving a smooth or plaited concavity in the front part.

Obs. *Cypræa Globulus* is the only species of this division which has not a papillated or rib-striated back; but it is so nearly allied to the *C. cic.racula* and others of that section, that I cannot place it in any other division. Some of the first species, as *C. limacina* &c. have very great affinity to the former section, but may be instantly distinguished from them by their pustulated back, and rather concave anterior part of the columella.

* *Pustulata*.

84. *Cypræa staphylæa*.—The mortified Cowry.

Testa ovata subrostrata, spadicea vel pallida, pustulis albidis elevatis ornatâ; lineâ dorsali impressâ, extremitatibus fuscis; basi albidâ, convexâ, luteo costatâ; margine suprâ crenulatâ.

Cypræa staphylæa. *Lin. Sys. Nat.* 1181. *Martini* j. 384. *Born. Mus.* 194. *Schroeter Einl.* j. 131. *Gmelin* 3419. *Schrei-*

ber's Conch. j. 76. *Lamarck, Ann. Mus.* xvi. 100. *Hist.* vii. 399. *Dillwyn.* 469.

Icon. *List. Conch.* t. 708. f. 58. *Gualt.* t. 14. f. F. *Argenville*, t. 18, f. S. *Knorr.* iv. t. 16. f. 2. *Martini* j. t. 29. f. 313, 314. *Born. Mus.* t. 8. f. 18. *Encyc. Method.* t. 356, f. 9.

Decorticata. Testa polita, fusca, albido punctata, basi semisulcatâ.

β. *Limacina.* Testa major, pallida; pustulis majoribus sparsis.

Cypræa limacina. *Lamarck. Ann. Mus.* 101. *Hist.* vii. 400.

Cypræa Oryza. *Solander's MSS.*

Cypræa Nucleus. *Martini* j. 333.

Cypræa Nucleus Var. *Dillwyn R. S.* 468.

Icon. *Regenfus Conch.* j. t. 12. f. 75. *Martini* j. t. 29. f. 312.

1. *decorticata.* Testa grisea, albida maculata.

γ. *atrata.* Testa extremitatibus nigris.

Inhabits Indian Ocean, *Humphreys.* *Mus. Brit. Nost.*

β. *Brit. Nost.* γ. *Brit.*

Shell ovate, greyish-brown, with numerous small elevated white pimples; the dorsal line impressed, narrow, as long as the shell; base white or whitish brown, convex, ribbed with elevated yellow-edged ribs, which are sometimes forked; margin above crenulated with white teeth; aperture linear; teeth close. Length $\frac{5}{10}$, diameter $\frac{3}{10}$ of an inch.

The larger variety, which may be, as Lamarck considers it, a distinct species, only differs from the former in having fewer and larger white convex spots; for I have specimens, the base of which are as completely ribbed as that of *C. staphylæa*; and when both sorts are partly worn, the ribs near the edge disappear.

85. *Cypræa pustulata.*—The pimpled Cowry.

Testa ovata, cinereo-plumbea, albo-lineata, sub-costato-striata; tuberculis rotundatis croceis, brunneo circumdatis, costis coadunatis, exasperatis; lineâ dorsali sub-impressâ, basi brunneâ, albo-costatâ.

Cypræa n. 47. *Schroeter Einl.* j. 146. (1)

Cypræa pustulata. *Solander's MSS. Portland Cat.* 101. Lot 1330. *Lamarck Ann. Mus.* xvi. 101. *Hist.* vii. 400. *Dillwyn R. S.* 469.

Icon. *List. Conch.* t. 710. f. 62! (1). *Sowerby, Genera.* f. 5!
Inhabits South coast of Mexico, *Humboldt and Bompland.*
 Coast of China, *Humphreys.*

Shell ovate, grey lead-coloured, with fine transverse white lines; back convex, obscurely longitudinally ribbed, ornamented with yellow semi-globose tubercles, which are situated on the obscure ribs, and surrounded with a chesnut-brown ring; the largest tubercles are generally placed near the central impressed dorsal line, and those near the margin often become confluent with the edge of the basal ribs; the base ovate, slightly margined and expanded, reddish-brown with distinct white, dark-brown margined ribs; aperture linear, slightly dilated in front; teeth distinct, distant, white; columella smooth, front part rather concave. Axis $\frac{7}{8}$, diameter $\frac{5}{8}$ of an inch.

86. *Cypræa Madagascariensis*.—The Madagascar Cowry.

Testa ovato-oblonga depressa, albida; tuberculis rotundatis; costis subanastomosis, coadunatis exasperatis; lineâ dorsali impressâ; basi convexâ, costatâ; extremitatibus rotundatis depressis.

Cypræa n. 45. *Schroeter. Einl.* j. 146. (1)

Cypræa Madagascariensis. *Gmelin* 3429. (1). *Dillwyn, R.S.* 468.

Cypræa Nucleus, Var. *Lamarck. Ann. Mus.* xvi. 101.! *Hist.* vii. 400.!

Icon. *Lister. Conch.* t. 710. f. 61.! (1) *Petiver's Gaz.* t. 80. f. 7. *Sow. Gen.* f. 6.!

Inhabits Pacific Ocean. Madagascar, *List.* Otaheite, *Lamarck.*

Shell ovate-oblong, depressed, bluish-white, ornamented with numerous unequally-sized roundish tubercles attached to anastomosing variously-sized yellowish ribs; the dorsal line distinct, impressed; the extremities depressed, rounded; the base convex, closely ribbed with yellow-edged white ribs; the aperture narrow, linear; teeth close, columella plaited, front part rather concave, inside violet. Axis $\frac{10}{10}$, diameter $\frac{7}{10}$ of an inch.

I am indebted to the kindness of Mr. Edward Crouch for the loan of a most beautiful and perfect specimen of this shell, from

whence the above description was taken ; they are usually dead shells which are found in the cabinets, when they are purplish-white ; and have generally been perforated with two holes in their back for forming necklaces, for which purpose they are used by the inhabitants of Otaheite.

87. *Cypræa Nucleus*.—The Kernel Cowry.

Testa ovata, gibba, albida, tuberculis rotundatis, costis sub anastamosis coadunatis exasperatis ; lineâ dorsali impressâ ; basi convexâ costatâ ; extremitatibus subproductis subrecurvis.

Cypræa nucleus. *Lin. Sys. Nat.* 1181. (1). *Born. Mus.* 194. *Schroet. Einl.* j. 130. *Gmelin* 3418. *Schreiber's Conch.* j. 76. *Lamurck. Ann. Mus.* xvi. 101. *Hist.* vii. 400. *Dillwyn, R. S.* 468.

Icon. Rumph. t. 39. f. I. (1). *Pet. Amb.* t. 16. f. 1. *Gaz.* t. 97. f. 12. *Gault.* t. 14. f. 2. *R. S. Argenville,* t. 18. f. V. *Knorr.* iv. t. 17. f. 4. *Favanne,* t. 29. f. R. 2. *Ency. Method.* t. 355. f. 2. *Born. Mus.* t. 8. f. 17.

Inhabits Indian Ocean, *Linnæus*. Island of Nassatello, *Rumphius*. *Mus. Brit. Nost.*

Shell ovate, brownish-white ; back rather gibbous, ornamented with numerous white brown-edged ovate or roundish tubercles attached to the anastomosing white brown-edged rib-striæ ; the dorsal line distinct, impressed ; extremities rather produced and slightly recurved ; the base convex, brownish-white, with numerous close white brown-edged ribs ; aperture narrow, linear ; teeth close ; columella plaited, front part concave. Axis $\frac{7}{8}$, diameter $\frac{4}{8}$ of an inch.

This species is distinguished from the former by the more convex back and more produced and slightly recurved extremities. It is only in very fine specimens that the brown edge to the ribs and tubercles can be distinguished ; in others the shell is all pale yellowish-white.

** *Rostrata*.

88. *Cypræa Cicercula*.—The Vetchling Cowry.

Testa ovata globosa, turgida, flavescens, fulva, marmorata ; pus-

tulis elevatis sparsis exasperatis, lineâ dorsali impressâ; basi convexâ, semisulcata; extremitatibus rostratis; sub-marginatis.

Cypræa cicercula. *Lin. Sys. Nat.* 1181. *Martini*, j. 339. *Born. Mus.* 195. *Shroet. Einl.* j. 132. *Gmelin*, 3419. *Schreiber's Conch.* 1. 77. *Lamarck, Ann. Mus.* xvi. 99. *Hist.* vii. 397. *Dillwyn, R. S.* 470.

Bonanni, Rec. 3. f. 243. and *Kirch.* f. 242. *List. Conch.* t. 710. 660. *Rumph.* t. 39. f. K. *Pet. Amb.* 16. f. 21. *Martini*, j. t. 24. f. 243. 244. *Born, Mus.* t. 8. f. 19. *Ency. Method.* t. 36. f. 1.

? *β. Timorensis*. "Testa læviuscula, posticè non rostrata, lactea." *Lamarck*.

Cypræa cicercula. b. *Lamarck. Ann. Mus.* xix 99. *Hist.* vii. 397.

Inhabits Mediterranean, *Linnaeus*. Ambøyna, *Rumphius*. China, *Humphreys*. *β. Timor, Lamarck.* *Mus. Brit. Nost.*

Shell ovate, globose, turgid, yellowish white, marbled, and irregularly spotted with fulvous, and roughened with many small elevated scattered pustules; the dorsal line impressed, leaving a deep groove over each extremity, and a slight one in the centre of the back; the extremities beaked and slightly recurved, and margined; the base convex, and half ribbed-striated; the aperture narrow, linear; the columella plaited, very deep, slightly concave in front; inside purple white. Axis $\frac{7}{10}$, diameter $\frac{4}{10}$ of an inch.

89. *Cypræa Margarita*.—The Pearl Cowry.

Testa ovata-globosa, turgida, albida, polita, concentricè striata; basi convexâ semi sulcatâ; extremitatibus rostratis.

Cypræa Margarita. *Solander's MSS.*? *Dillwyn, R. S.* 474.? *Rumphius*, t. 39. f. N. *Pet. Amb.* t. 16. f. 23? *Gualt.* t. 14. f. M.? *Martini*, t. 24. f. 242.?

Inhabits Japan, *Sloane. Mus. Brit.*

Shell globose, with a small produced and slightly recurved beak at each end, white, polished, smooth, except towards the outer edge, where it is finely and sharply concentrically striated; base slightly thickened, polished, scarcely extended to the sides;

mouth considerably longer than the shell, narrow, rather broader and concave in front. Teeth rather distant, small, equal, very slightly extended over the lips; columella deep, plaited, front concave, nearly smooth; spire flat, rather large. Axis $\frac{8}{10}$, diameter $\frac{5}{10}$ of an inch.

The only specimen I have seen of this shell is not complete; but it appears to be distinct from the young of the former, by its not being so gibbous. It agrees pretty well with Dillwyn's description, but the figures are all doubtful.

90. *Cypræa Globulus*.—The globular Cowry.

Testa ovato-globosa, ventricosa, lævis, fulva, punctis rufo-fuscis sparsis, ornatis; lineâ dorsali nullâ; extremitatibus rostratis, submarginatis.

Cypræa globulus. *Lin. Sys. Nat.* 1181. *Martini*, j. 388. *Born. Mus.* 195. *Chemnitz*, x. 104. *Gmelin*, 3419. *Schreiber's Conch.* j. 77. *Lamarck, Ann. du Mus.* xvi. 99. *Hist.* vii. 398.

Cypræa affinis. *Gmelin* 3420

Rumphius, t. 39. f. L. *Petiv. Gaz.* t. 97. f. 14. *Amb.* t. 16. f. 19. *Gualt.* t. 14. f. N. *Knorr*, vi. t. 21. f. 7. *Chemnitz*, x. 145. f. 1339, 1340. *Born. Mus.* t. 8. f. 20. *Ency. Method.* t. 356. f. 2.

Inhabits Asiatic Ocean, *Linnaeus*. Amboyna, *Rumphius*.

Shell ovate globose, ventricose, smooth, polished, yellowish fulvous, ornamented with scattered reddish brown spots, the dorsal line imperceptible, except just over the posterior extremity, where there is a very slight concavity; the base convex, orange, with margin rather tumid and rounded, except at the hind extremity where it is slightly produced; the aperture narrow, linear; teeth close, small, with the grooves extended half-way over the base; the columella obscurely plaited, very deep, and slightly concave in front; inside purplish white. Axis $\frac{6}{8}$, diameter $\frac{3}{8}$ of an inch.

I have seen several specimens of this, and *C. cicercula*, which had been painted with yellow rings; and I have also an obscure recollection of having seen a specimen of a very similar species to *C. Globulus*, with natural reddish-brown rings, which I suppose the former were intended to represent; and I have in a MSS.

catalogue of *Cypræa*, a species arranged next to the latter, called *C. annulata*.

91. *Cypræa Childræni*.—Mr. Children's Cowry.

Testa ovata, subcylindrica, palida costato; striata-linea dorsali sub impressa, indistincta; basi planâ; extremitatibus subrostratis compressis, infra carinatis.

Icon. *Zool. Journ.* t. . . f.

Mus. Brit.

Shell ovate, somewhat cylindrical, white or yellowish, with an irregular fulvous spot just over the spire, and another on the hinder part of the back, covered with ribstriæ, which meet in the middle of the back in an obscure dorsal line; base flat, the extremities rather produced and compressed, so as to have a keel on each side of the base; aperture narrow, slightly dilated in front; columella deep, plaited, and rather concave in front. Axis $\frac{8}{12}$, diameter $\frac{5}{12}$ of an inch.

I take the opportunity of dedicating this curious species to my excellent friend J. G. Children, Esq. whose extensive acquirements and zeal in science need not my feeble praise.

[To be continued.]

ART. LXIII. *Abstract of a Notice relating to the Ætheriæ found in the Nile by M. Caillaud; by M. DE FERUSSAC; * together with a Description of a new Species of Ætheria. By G. B. SOWERBY, F. L. S.*

NATURALISTS have been informed by M. Caillaud, on his return from Egypt, that he had collected Oysters in the upper parts of the Nile; this information was of a nature to excite the curiosity of Geologists and to interest them; because, thereby, some formations, reputed marine, on account of the presence of the Fossil Oysters they contained, and attesting, by their alternation with deposits formed under fresh water, the return of another sort of fluid,

* Translated from the Memoires de la Soc. d'Hist. Nat. de Paris.





might be considered, at least, as of a problematical nature. It might be concluded from this fact, that at a time when animal life and vegetation were so different from what they are at present, Oysters might live in fresh water and consequently alternations, founded upon the presence of any of these shells, might not be admitted.

Already several genera, which were thought to be exclusively marine, such as the *Mytili*, the *Modiolæ*, and the *Corbulæ*, have been found in fresh water. If to these are added, such genera as are only found in fresh water rivers or lakes, such as *Anodon*, *Unio*, and *Cyclas* which are found every where; the *Cyrena* and *Iridina* which live only in the rivers and lakes of the East and of India; the *Hyria* and *Castalia* of America, and the *Galathea* of Ceylon, we shall have enumerated all the genera of bivalve mollusca, not exclusively marine.

Not a single irregular shell, of a thick, foliated structure, adhering to the rocks or to each other, and consequently deprived of locomotion, and varying in form according to the nature of the substance to which they adhere, and by their accumulation producing true *beds* (*couches*), had as yet been discovered in fresh water: such, however, are the Shells which M. Caillaud has found, and the following is the information we have received from this zealous Traveller. "We first meet with them," says he, "after passing the first cataract; and they do not appear to exist below; they become very abundant in the province of Rebata, beyond the Peninsula of Merôë. The inhabitants collect them on the banks of the river, to ornament their tombs with them, and they say that they come from the more elevated parts of the Nile, from Saïda, where they are eaten." M. Caillaud has found them as far as Fazoql, the most distant country into which he has penetrated upon the Blue River. In Senaar, the inhabitants informed M. Caillaud, that during the summer season, when the river was low, they took them with the animal, but notwithstanding all his endeavours, M. Caillaud could not obtain any living specimens, the river being always too high. They are said to be very common in the Jaboussi, a river which runs into the Blue River, and in all appearance the numerous confluent

streams of this great arm of the Nile produce them also. The number found upon the tombs throughout *Æthiopia* is so great, that it is astonishing that Bruce and Burckhardt should not have mentioned them.

We had already begun to suspect that these interesting Shells might not be Oysters, and at first sight we discovered that they were *Ætheriæ*, an extremely rare genus, known only in a few Cabinets, and instituted by Lamarck in the *Annales du Museum*. This celebrated author has described the *Ætheriæ* as inhabitants of the depths of the sea, although he had no further proof in support of this opinion, than their relation to the *Ostreæ*, and in fact, it is difficult to distinguish them at first sight. The species brought by M. Caillaud bears so striking a resemblance to some Oysters, that he may be well excused for not having discovered the differences, the principal of which consists in the *Ætheriæ* having two muscular impressions, while the *Ostreæ* have only one. This difference has induced M. Lamarck to place the *Ætheriæ* in the family of the *Chamæ*, consequently very far from the Oysters, to which they possess such great analogy, both in the general appearance (*facies*) of their valves, the manner of life of their animals, and particularly by the displacement of the upper valve, and the elongation of the beak of the lower valve, characters peculiar to the *Ostreæ* and *Spondyli*. The question might here be raised, whether the consideration of the number of muscular impressions, should, in a Classification, founded upon natural bases, be regarded as of more importance than such marked and near analogies. According to M. Blainville, it is probably wrong to separate the *Ætheriæ* from the *Ostreæ*, for "it is evident," says he, "that the number of muscular impressions is not sufficient to dispose in a natural manner, the calcareous envelopes of mollusca of this class." It is nevertheless remarkable that the *Chamæ* also possess important analogies with the *Ætheriæ*; for like these latter and the Oysters, they adhere to other substances and are deprived of locomotion, they are irregular, inequivalve, &c., but their aspect is very different, as well as the nature of their shells. It is therefore necessary to examine the animal of the *Ætheria*, in order to ascertain whether

the characters it presents prove its relation to the one or the other of these two families, which are placed in two different orders. In one of these orders, the Ostracea, the *mantle is open* and without tubes or particular apertures; in the other, the Cardicea, which comprehends the family of Chamæ, the mantle, open in the front, presents also two separate apertures for the excrements and respiration. It is easily conceivable, that these characters, of far greater importance than the number of muscular impressions, might prove the propriety of placing the *Ætheria* in the family of Ostracea, if the animal presented the characters of the order to which it belongs. Further, it is observable that muscular impressions present greater variety than has generally been supposed. The division into one or two great muscular masses is undoubtedly sufficiently precise, but the less considerable muscles, whose impression is not strongly marked, have been neglected. M. Cuvier in restoring the genera *Crenatula*, *Avicula*, *Pinna*, &c., placed by Lamarck in the *Monomyaria*, to the *Acephala dimyaria*, has already shown that this character may lead into error. Thus the order of *Ostracea*, to which the *Ætheriæ* seem to be most nearly related, contains also *Acephala dimyaria*, among which they ought to be counted. We shall add that several other shells present three and even four distinct impressions, and that the number of muscles of attachment does not appear to be confined to the two masses commonly distinguished; (almost all the *Uniones* and *Anodonti* present four separate muscular impressions;) and we have never yet distinguished in a comparative manner, which of the muscles of attachment acquires a predominance over the others, according to the form of the animal, the size or form of the valves, &c.

However, the shells brought by Mr. Caillaud, not belonging to the genus *Ostrea*, it cannot be thence concluded that Oysters formerly lived in fresh water, but it would not be surprizing if beds should be met with in which shells at first taken for Oysters should prove to be *Ætheriæ*. The discovery which proves that this genus belongs to fresh water, is an interesting fact which appears to deserve the attention of Naturalists.

The genus *Ætheria* was so little known some years ago, that M. Cuvier has not mentioned it in his *Règne Animal*, but it has

been adopted by Ocken, and Schweigger ; and Mr. Sowerby in his Genera of Shells, has figured one of the species described by Lamarck, *Ætheria semilunata*: that which has been brought by M. Caillaud appears to be distinct; it even proves, by its extreme variety in form, that the four *Ætheriæ* of Lamarck only constitute two species; these shells presenting the most singular variations according to the form of the substance to which they have been attached, and being fixed indiscriminately by one or the other valve, which changes the relative position of the ligament and umbones, and renders them dextral or sinistral. Having examined and compared all the known individuals of the species described by M. Lamarck, we have been confirmed in the opinion we had adopted upon seeing such diversified specimens of M. Caillaud's. The names given by Lamarck to these species, being taken from their forms, cannot be preserved. We therefore propose the specific name of (1) *Ætheria Lamarckii*, for the species formed by the combination in one of the *Ætheriæ* elliptica and trigonula of Lam. (2) *Ætheria Caillaudi*, for that which M. Caillaud has brought from the Nile, and which differs from *Ætheria Lamarckii* in the colour of its pearl, which is very micaceous and white; in its less elliptical, more elongated, and often very narrow shape, and in its beak being sometimes several inches long: that of (3) *Ætheria plumbea* for Lamarck's *Ætheria semilunata* and *transversa*.

*Some Account of a fourth Species of ÆTHERIA, by G. B.
SOWERBY, F. L. S.*

One of the most interesting and valuable of the numerous undescribed species of Testaceous Mollusca, which I have purchased in the collection of the venerable George Humphreys, (a celebrated dealer, whose practical knowledge has far exceeded that of any other person in the business), and which I found among his *Ostrea Hyotes*, but without any ticket, was this *Ætheria*: it is the more interesting as it bears a resemblance to another division of the *Ostreæ*, from its having the irregular tubular spines, so characteristic of Lamarck's *Ostrea Hyotis* and *imbricata*.

- (4) *Ætheria tubifera*, testâ irregulari (forma speciminis transversa) valvâ superiore spinis irregularibus tubulosis conpersâ.

This species, like the other *Ætheriæ*, is extremely irregular in its form : it is of a dull green colour and iridescent within ; the outer surface of the upper valve is of a dark blackish green, except where it is eroded, and it is sprinkled over with large irregular tubular spines. From an examination of this specimen, together with one of *Ætheria Lamarckii* in the Tankerville Collection, I have ascertained the meaning of Lamarck's "callosité oblongue dans la base de la coquille," which is actually only the termination of the ligament, which in this genus, as in *Unio*, *Anodon*, and others of Lamarck's *Naiades* is placed in a sinus ; affording another mark of analogy with them, and probably an evidence of affinity as an osculant genus.

ART. LXIV. *Reply to Mr. Swainson on Neritina Corona and Melania setosa.* By JOHN EDWARD GRAY, Esq. M. G. S.

[To the Editors of the Zoological Journal.]

GENTLEMEN.

MR. SWAINSON, in his remarks on my account of the *Melania setosa*, asserts, firstly, that in quoting Lister t. 1055, f. 8, for his shell, I set aside the authority of *Linnæus*, *Gmelin*, *Martini*, and *Lamarck* ; secondly, that his shell, although not new to science, has never been described or publicly recorded ; thirdly, that the spines of *Neritina Corona* are not tubular. That these assertions are unfounded, I think the following facts will prove.

In the twelfth edition of the *Systema Naturæ* of *Linnæus*, the figure of Lister mentioned above is not at all cited ; neither is it referred to by *Martini* in his *Conchylien Cabinette*. The continuator of this work, *Chemnitz*, does indeed mention it as a "notable variety" of the Papal Crown, which, in his irregular

nomenclature, placed as it is under a distinct head, may be regarded as equivalent to a modern species. By Gmelin it is referred to as his type species, the figure of Chemnitz being curiously enough cited as the variety; and it is also quoted by Lamarck as his *Melania amarula*, (with the character of which, "spirâ exsertâ," it does not agree,) the figure of Lister which actually represents this species being overlooked. Thus, of the four writers whose authorities I am reproached with having opposed, two do not quote the figure in question; Chemnitz, I am justified in regarding as concurring in the opinion which I have advanced; and the other two appear to have referred to it inadvertently, one having regarded the species to which it belongs as a mere variety, and the other having quoted it as representing a species with his own character of which it does not accord.

In reply to the second statement, it will be sufficient to offer the following synonyma, which, after the most careful examination, appear to me to refer to the *Melania setosa*, Sw., which it is assumed "has never been described or publicly recorded"

Buccinum aculeatum. Lister, *Mantissa*, t. 1055, f. 8.

Buccinum fluviatile, spirâ primâ satis elongatâ, mucrone aculeis coronato; ore lato integro, repando, costisquestriatis eminentibus exasperatis; colore pullo-nigricante. *Gualt.* Ind. t. 6, f. B.

Pabstkrone des flussen Wasser, mit weiter mundung gerrant, &c. *Martini Berl. Mag.* iv. 292.

Thiara fluviatile ventrue et epineuse. *Buccinum fluviatile* ventricosum, longis aculeis raris et spinis exasperatum; aperturâ magnâ integrâ; colore corneo pellucido. *Favart. Dict.* iii. 377.

Thiara fauve, rare, de figure courte et renflée, très grande, ayant dix sept lignes de long sur un pouce de large. *Favanne Cat.* 133. p. 23.

Varietas notabilis thiarae fluviatilis, testâ ventricosiore, claviculâ brevior. *Chemnitz* ix. p. 159.

Spirilla spinosa. *Humphreys.*

Helix amarula. β. *Gmelin*, 3656.

Helix amarula. 2. *Turton Syst. Nat.* iv. 535.

Helix amarula. Var. *Dillw. Rec. Shells*, ii. 961.

Melania setosa. *Swainson, Journal of Science.*

Bulimus amarula. Var. *Brug. Dict.* 309.

Icon. *Lister, Mantissa*, t. 1055. f. 8. (full grown.) *Gualtier, Ind.* t. 6. f. B. *Martini, Berlin Mag.* iv. t. v. f. 646. (young). *Chemnitz*, ix. t. 134. f. 1220, 1221. (young, probably a copy of the last.) *Favanne* t. 61. f. 9. (young.) *Zoological Journal*, t. 8. f. 6. (full grown, 6. young, 7. spine, 8.)

It thus appears that the shell in question had been described by no less than four authors from different specimens, and that four original figures of it had been published, previously to that in the "Journal of Science and The Arts." The figure of Favanne is particularly characteristic, and was instantly recognized by two conchological friends to whom it was shown.

With respect to the third point, the tubular nature of the spines of *Neritina Corona*, *Lam.*, I shall abstain from commenting on the uncertainty which must ever attend the negative evidence to be deduced from a particular character not having been described by preceding authors. A reference to the shell itself, which has lately become not uncommon, would at once prove that the spines are tubular, as I described them: but as authorities may be regarded as possessing more weight than would attach to any statement that I could advance, I shall subjoin a few which demonstrate the justness of my previous remarks. Chemnitz in his specific character, p. 68, as correctly quoted by Mr. Swainson, does not notice the perforation of the spines, but in his description, p. 70, he says expressly, "Sie sind innerlich hohl wie ein Rohr," they are inwardly hollow like a reed. Even on the opposite page, p. 69, to that from which Mr. Swainson copied the specific character, among the synonyma of this shell, are the following:

Une nerite des Indes, rare, vert foncé, a six epines *forées* placées le long du milieu de la spirale, de plus en plus grandes à mesure qu'elles approchent du bord; la dernière de ces epines est souvent plus longue que la coquille même. *D'Avila, Cat. Raisonnée*, j. n. 964. p. 430.

Nerite epineuse. *Nerita fluviatilis spinis perforatis et elatis armata, ex colore viridi nigrescens; columella edentula et intus propensa; testa tenuis insignis.* *Les epines en forme de petits*

tuyaux capillaires sont distantes les unes des autres et un peu inclinées. Favart D'Herbigny, *Dict.* ij. p. 444.

De Montfort, who considers this shell as the type of his genus *Clithon*, (vol. ii. p. 327) observes in his description, "Son dos est chargé d'épines longues arquées, dont la dernière percée forme un sinus à la levre extérieure, les autres sont successivement oblitérées.

I might adduce other testimonies to the same effect, but as I trust that these are sufficient to prove that the statements I formerly advanced are fully borne out by evidence, I shall abstain from further remark, relying on your liberality for the insertion of this necessary defence of the accuracy of my observations.

I remain, yours truly,

Nov. 3, 1824.

JOHN EDWARD GRAY.

NOTE.—During the time that this letter has been passing through the press, the Baron de Ferussac has published his remarks on Mr. Swainson's and my papers, in his *Bulletin des Sciences Naturelles*, [November, p. 318,] in which he agrees with me in all the main points of my observations, and has also referred to many of the above quoted Synonyma and plates. J. E. G.

ART. LXV. *Descriptions of some rare, interesting, or hitherto uncharacterized subjects of Zoology.* By N. A. VIGORS, jun. Esq. M.A. F.L.S. With Figures by JAMES DE CARLE SOWERBY, Esq. F.L.S.

[Continued from p. 418.]

Classis. AVES. Auct.

Fam. PSITTACIDÆ. Leach.

The vast recesses of Australasia, which have supplied the naturalist with so many distinct and varied forms in every branch of Zoology, have presented no groups where the general structure is marked by more distinguishing, and if I may use the word, national, peculiarities than the family before us. The *Parrots* of that great division of the globe are not merely numerous in

species, and varied in plumage, but generally speaking are endowed with characters that separate them into groups decidedly distinct from those of the Old World and America. A few of these forms are found partially to extend over the Islands of the South Seas: and these in conjunction with other similarly circumstanced groups may be noticed as connecting the Zoology of the newly explored continent of New Holland with that of the antient continent. The arrival in this country of a hitherto rare species, which is the representative in the South Seas of a form very generally diffused throughout New Holland, and of which several specimens have lately come under my observation, affords me an opportunity of characterizing one of the most extensive of these groups, and at the same time of adding representations of a few of the rarest species belonging to it.

Genus PLATYCERCUS.

Rostrum breviusculum, mandibulâ superiore rotundatâ, dilatâ, inferiore brevi, profundè emarginatâ, apice quadrato, myxâ convexâ, glabrâ, integrâ: naribus rotundis, in ceromate angusto medio emarginato, positis.

Alæ rotundatæ; remigum,* primâ exceptâ, pogonio externo abruptè prope medium emarginato; primâ 2dâ brevior, 5tæ præcipuè æquali; secundâ et tertiâ longissimis.

Cauda lata, depressa, subrotundata, gradata; rectricibus apice subrotundis.

Pedes, tarsi elevatis; acrotarsiis reticulatis; digitis gracilibus, elongatis; unguibus longis, parum falcatis.

Typus genericus, *Ps. Pennantii*, Lath.

The interesting group that forms the present division of the *Psittacidae*, is at first sight immediately recognized as distinct from all those which are included under the general name of *long-*

* The term *remex* in its original signification was masculine, and as such I applied that gender to the term throughout the descriptions of the groups of *Falconidae* in the last Number of this Journal. I find however that it is usually employed as a feminine noun when applied to Ornithology, and for the sake of *uniformity* I shall adhere to this form in future.

tailed Parrots, and which M. Kuhl has separated as a section with the title of *Conurus*, by the breadth, depression, and rounded apex of the tail: the greater number of the other groups in the same section having that member narrowed and cuneated. The wings also like the tail are rounded, the first quill feather being shorter than the second; whereas in most of the neighbouring long-tailed groups the first and second quill feathers are of equal length. All the primary quill feathers except the first are marked by an abrupt emargination of the outer web near the middle; a construction, which seems peculiar to the present division of the long-tailed *Psittacidae*, with the exception of that of *Pezoporus*, Ill. The upper mandible is short, strong, and dilated, with a considerably rounded *culmen*: the under is shorter than usual, and the apex being abruptly bent inwards, the emargination is deeply marked, and forms a profound groove. The *myxa* is convex and entire, in which particular the present group differs from some of the adjoining, where the *myxa* is more or less ridged. The *tarsi* are elevated, and the toes and nails are long and slender. In these last characters the present genus evinces a near alliance to *Pezoporus*, in which the emargination of the quill feathers also is apparent, although it is less abrupt, and commences nearer the apex of the feather. These two conterminous genera differ chiefly in the tail of the latter being more narrow and cuneated, the *ungues* being straighter, and the lower mandible possessing a less profoundly sinuated emargination, together with a sulcated *myxa*.

The genus *Platycercus* contains a considerable number of species corresponding with the characters given above of the type *P. Pennantii*. Among the best known of these are *Psitt. flavigaster*, Temm., *eximius*, Lath., *erythropterus*, Sh.; to which the beautiful species *Psitt. Brownii*, and *Baueri* of M. Temminck may also be added. *Psitt. cornutus*, Gmel. comes into the group with the conterminous species, which I am about to particularize in this article, of *P. Pacificus*, Lath., *auriceps*, Kuhl, and *Ulietanus*, Lath. The well known species *Psitt. scapulatus*, Bechst. also appertains to this genus, with which it accords in the important characters of the wings, tail, and legs: but it seems to be placed at the extremity of the group in consequence of its bill being

somewhat longer and more compressed, and the under mandible less abruptly bent inwards, and consequently less emarginated. I have not had an opportunity of determining, whether the species so nearly allied to the last, at least in general appearance, as to have been confounded with it until lately, the *Psitt. Tabuensis*, Lath., may be referred to the same group; the only specimen which I can ascertain to have been brought to this country having been suffered at the late sale of Mr. Bullock's Museum to be transmitted to a continental collection. But from the general resemblance which the two species bear to each other, I make no doubt of their being congenerick.

PACIFICUS. Lath. *P. viridis, sincipite maculâ postoculari uropygio plerumque ejusque lateribus coccineis.*

Tab. Sup. 1.

Rostrum argenteum apice nigro. *Corpus* superné læté viride, subtus pallidius. *Alula*, *pleromata*, *remigesque* primariæ externé cæruleæ, interné fuscæ: *remiges* secundariæ externé virides, interné fuscæ. *Rectrices* quatuor mediæ virides, externæ flavo-virescentes, subtus flavo-fuscæ. *Pedes* subpallidi. *Irides* brunneæ. *Longitudo corporis* 11—13 Poll.; *mandibulæ* superioris ad frontem et ad rictum $\frac{4}{5}$, inferioris $\frac{3}{5}$; *tarsi* $\frac{9}{10}$; *digiti* externi anterioris $\frac{4}{5}$, posterioris $\frac{3}{4}$; *unguium* externorum $\frac{2}{5}$.

Habitat in Insulis Novâ Zealandiâ, Macquarrianâ, Otaheite.

In Mus. Brit., nost.

This species, figured apparently for the first time in Forster's Drawings, [Icones 46 & 47, in Bibliothecâ Banksianâ,] was for the first time also named as above in Dr. Latham's "General Synopsis of Birds." It was afterwards* figured by M. Sparmann

* The first volume of Dr. Latham's "Synopsis," in which this *Parrot* was named and described, [p. 252] was published in 1781. The "Museum Carolæonæum" appeared five years afterwards, in 1786. In the "Index Ornithologicus," which was published in 1790, subsequently to the appearance of M. Sparmann's Work, Dr. Latham, as soon as it was in his power, referred to his name and his figure. [See Ind. Orn. p. 101. No. 65. vars.] It is but justice to the venerable British Ornithologist to state these facts, as well to evince the priority of his name, as to clear him of the following imputation of inaccuracy,

in his "Museum Carlsonianum," [t. 28.] and distinguished by the denomination of *Nova Zealandie*. Dr. Latham's name has undoubtedly the right of priority: and it has also the merit of being more appropriate. In general, names derived from the *habitat* of subjects of Zoology should be sparingly, if at all, made use of: and in future the institution of such names, which may lead to confusion in being found inapplicable to all the individuals of a species, ought as much as possible to be avoided. But when once they have been established, as in the case before us, it would be unwise to make any alteration, where they are not altogether erroneous. Dr. Latham's name will as yet apply to the whole of the present species, although it appears to be spread over a great extent of the southern Pacifick ocean: whereas that of *Nova Zealandie* is too confined in its application. I know not therefore why M. Kuhl in his Monograph on this family should have rejected the prior and more appropriate term of *Pacificus* in favour of the later, and altogether inapplicable name conferred by M. Sparmann.

The species varies considerably in the greater or less prevalence of the scarlet colour on the head, the *uropygium* and the sides of the lower abdomen: the extent of the silvery colour on the bill also varies. This variation does not appear to depend upon the locality of the individuals; as several specimens which I have examined that came from the same quarter, Macquarrie Island, exhibited the greater part of the different varieties that have been noticed in this bird. The difference seems to depend more upon age than situation; the specimens to which I allude as having come under my notice, and shewing these differences, having died at different periods since their arrival in this country. There is a considerable difference also in their size, their length varying in general from eleven to thirteen inches. A specimen in the British Museum which has every indication of belonging to this species, is only nine inches and a half in length. They appear an active and restless species; and, generally speaking, very in-

which has been incautiously brought against him by the late M. Kuhl, in his description of this bird. "Mus. Carlson. 28. *fig. optima, quam Lathamius non citavit.*" Nova Act. Acad. Cæsar. Nat. Curios. tom. X. p. 44.

docile. The most remarkable peculiarity that struck me in their habits was the custom of continually jumping upwards, and always from the ground. They seemed indeed generally to prefer the bottom of their cage to the perch. Were I to allow myself to draw an inference respecting the habits of the group, from my observations on a few individuals belonging to it, aided however by the consideration of the before mentioned prominent character of the elevated *tarsi*, I should say that the habits of this genus closely approach those of *Pezoporus*, which has always been described as living on the ground.

Although the species has been well figured by M. Sparmann, yet as his work is not one of common occurrence, and his figure besides is that of a variety, not furnished with the full markings, I am induced to have it again represented, and in what appears to be its perfect plumage. As the Conductors of this Journal have determined on publishing Supplementary Plates, in addition to those included in the work itself, in order to meet the encreasing number of new forms and species with which every day enriches our collections in Zoology, the *P. Pacificus* will be figured in the first of these plates.

AURICEPS. Kuhl. *P. viridis, subtus pallidior, fasciâ frontali crissoque coccineis, vertice flavo.*

Tab. Sup. 2.

Rostrum argenteum apice nigro: *pteromata remigesque* ad basin cæruleæ. *Rectrices* virides, flavo-marginatæ, subtus flavescentes. *Longitudo corporis* $6\frac{5}{8}$; *mandibulæ* superioris ad frontem et ad rictum $\frac{1}{2}$; *tarsi* $\frac{5}{8}$.

Habitat ———

In Mus. Brit.

P. Pacificus, var. c. Lath. Syn. I. p. 253.

P. auriceps. Kuhl. Nov. Act. Acad. Cæs. Nat. Cur. p. 46.

This is one of the many instances in which the contents of our British Collections, publick and private, have been assigned to foreign Zoologists to be named and described. It is of little con-

sequence, it is true, to science in general, by whom the productions of Nature may be characterized, provided the task is accomplished with ability. But every country ought at least to take its share in the general labours of the science, and more particularly in those departments of it, which its peculiar resources and opportunities afford it the means of studying and illustrating to advantage. We certainly give a tacit assent to the imputation which is so generally cast upon this country by continental writers, that we possess no school of Zoology, when we actually apply to foreign naturalists to come into the recesses of our collections, and appropriate to themselves the descriptions of our choicest treasures. This inactivity on our part, or carelessness, or whatever else it may be considered, that has hitherto prevailed, is deeply to be lamented; but it is not too late to retrieve it. We have still subjects remaining in our collections, by hundreds or rather by thousands, unfigured and uncharacterized; and our extensive connections abroad constantly supply us with a succession of new and interesting forms and species. May we not hope that the possessors of these treasures may be induced to bring them into light; and thus contribute to those higher and more generalizing views, with which the science is now usually cultivated, and which are advanced in proportion to the extent to which the works of Nature are made known?

The *Platycercus auriceps* was originally described as a variety of *P. Pacificus* in the "General Synopsis of Birds," and was first named and characterized as a distinct species by the late M. Kuhl, in his recent visit to this country. It differs from *P. Pacificus* by its inferior size; by the red markings of the head being restricted to a narrow band on the front; and by the yellow colour of the *vertex* of the head, and the scarlet of the *crissum*. M. Kuhl, in his Monograph on the family [p. 46.], asserts, that it is a New Holland species; and the specimen in the British Museum is marked as coming from that country: most probably, after M. Kuhl. Dr. Latham, on the contrary, states that the specimen he described, which was in the collection of the late Sir Joseph Banks, came from New Caledonia. I have reason to suppose that the bird now in the British Museum is the same specimen that

was described by Dr. Latham ; and also that the locality he has assigned the species is most probably correct. That portion of the group of *Platycercus* to which it seems most closely allied, the *P. Pacificus*, *Ulietanus*, and *cornutus*, are inhabitants of the South Sea Islands. These exhibit a general similarity in their markings: their bills are of a silvery colour at the base, with a black *apex*, and the plumage is more plain in general than that of their congeners of the Australasian continent. These latter indeed are particularly distinguished by the variety and beauty of their plumage, in which there is also a general uniformity in the disposition of the colours ; and some species of them which may decidedly be considered the most beautiful of the family, such as the *P. Brownii* and *Baueri*, seem to retrieve the whole group from the charge of being too gaudy and imposing in their plumage, by the extreme delicacy of the azure, white, and lemon colours that predominate in theirs. This similarity of colouring is often an important guide to the knowledge of the geographical distribution of groups : and in the present instance may be cited in corroboration of the correctness of the locality which Dr. Latham has subjoined to this species. But such a mode of reasoning must be adverted to with caution. Our science is founded on facts, and not on theory : and where there is a difference in the statements of authors respecting a matter of fact, we must wait for a further knowledge of that fact alone, and not have recourse to conjecture, to decide between them.

ULIETANUS. Lath. *P. olivaceus, subtus flavus, capite, caudâ, remigibusque brunneo-fuscis, uropygio obscuré coccineo.*

Tab. Sup. 3.

Mandibula superior argentea, apice nigro ; inferior nigra. *Rectrices* fuscæ, subtus pallidiores. *Pectus abdomenque* flava. *Longitudo corporis* $10\frac{5}{8}$; *mandibula* superioris ad frontem $1\frac{3}{10}$, ad rictum $\frac{3}{4}$; *tarsi* $\frac{7}{8}$.

Habitat in Insulâ Ulietâ Maris Pacifici.

In Mus. Brit.

Ps. Ulietanus. Gmel. Syst. 1. p. 328.

..... Lath. Ind. Orn. p. 103.

..... Kuhl. Nov. Act. Acad. Cæs. Nat.

Cur. T. x. p. 44.

Society Parrot. Lath. Syn. 1. p. 250. No. 52.

This species is also to be added to that group of *Platyercus* which I have just particularized as apparently representing the New Holland species of the same genus in the Pacific Islands. There are one or two other species of *Psittacidae*, from the same quarter, described by authours, which, when better known, will probably be referred to the same group; if I may judge at least from some of the specifick characters assigned them. But the specimens themselves are beyond my reach. And when the describers of birds pass over the really important characters of their structure, and dwell alone upon the colours of their plumage, it is impossible to speak with any certainty as to their affinities, or station in nature.

Genus. PSITTACUS. Linn.

A recent acquisition to my collection of two small South Sea Parroquets, which arrived in the vessel that conveyed the late unfortunate King and Queen of the Sandwich Islands to this country, enables me to give a detailed and corrected account, and a figure also for the first time, of a species of this family, which was originally named by Dr. Latham, from a specimen in General Davies' collection; but which does not appear* to have been characterized with the former gentleman's usual accuracy. His description was most probably taken from an immature or imperfect

* In the second Supplement to his "Synopsis," Dr. Latham describes the bill of this bird as "pale," and the "legs red." [page 90, No. 16.] In the "Index Ornithologicus," he states the bill to be black and the legs pale.—["rostrum nigrum; pedes pallidi." Sup. p. xxii. No. 7.]—In the last edition of the "Synopsis," he merely repeats his former statement respecting the bird, but describes the legs as red. [Vol. ii. p. 193.] M. Kuhl copies the error respecting the bill from the "Index Ornithologicus," but makes no reference to the legs. [Nov. Act. &c. p. 94.]

specimen. The species does not seem to have been noticed since his first description of it: M. Kuhl having referred it, in his Monograph, to those species which he pronounced dubious, or entirely unknown to him. It belongs to a group very distinct in itself, but of which, although I can discern the leading characters, I do not feel satisfied respecting the limits. I shall therefore refer it for the present to the comprehensive genus of *Psittacus*.

PYRRHOPTERUS. Lath. *Ps. submacrourus viridis, vertice regioneque parotica caruleis, fronte gutture torqueque obscuro nuchali pallidé cineracco, tectricibus inferioribus aurantiis.*

Tab. Sup. 4.

Rostrum pedesque pallidi; remiges interné fuscae, externé carulescentes: abdominis latera sub alis aurantia. Irides nigrae. Longitudo corporis $7\frac{1}{2}$; rostri $\frac{3}{10}$; tarsi $\frac{6}{10}$.

Habitat in Insulis Sandvicensibus.

Ps. pyrrhopterus. Lath. Ind. Orn. Sup. p. xxii. No. 7.

Orange-winged Parrakeet. Id. Syn. Sup. ii. p. 90. No. 16.

From the distinguishing specific character of the bright orange colour of the inferiour wing coverts, I make no doubt that my bird is the same as that described by Dr. Latham, although from the difference in some minute particulars I might perhaps consider myself authorized to keep it distinct. He describes his species as Brazilian in the "Index Ornithologicus:" but as he originally stated his doubts on this point in the Supplement to his "Synopsis," where he first named the species, saying that it "inhabits the Brazils, or is at least supposed to do so, being brought into England by one of the ships trading to the South Sea whale fishery,"—we may venture, I presume, to take it for granted that the locality of both our birds may be the same. In Shaw's "Zoology," the description of the species is merely a repetition of that of Dr. Latham.

These little birds exhibit none of the bright colours that generally distinguish the *Parrots*; but they possess a delicacy both in form and plumage, that amply compensates for the want of the more brilliant appendages of their congeners. In their manners

they are peculiarly interesting. Strongly attached to each other, like the individuals of the small species, so well known in our collections, and which we familiarly stile *Love-Birds*, they assert an equal claim to that title, if it is to be considered the reward, or the distinctive sign, of affection. They will not admit of being separated even for a moment; and whether in their cage or at liberty, every act and every movement of one has a reference to the acts and movements of the other. They are lively, active, and familiar; distinguishing and following those who attend to them with perfect confidence; but *always in concert*. Their movements are less constrained than those of *Parrots* in general, approaching, both on the ground and the wing, to the quick pace, and short and rapid flight of the more typical *Perchers*. They have apparently less powers of voice than the greater part of the family; uttering only a sort of chirrup like that of the *Sparrow*. This is shrill, it must be confessed, at times when rivalry, or any particular incitement, induces them to exert their voice to the utmost: but at other times it is far from unpleasing, more especially when they employ it, as is their custom, either in welcoming the approach of the morning, or acknowledging the attentions of a favourite. They appear extremely delicate in their constitution, and susceptible of cold: but it is to be hoped that a close attention to their comforts will enable the little strangers to brave the inhospitality of our climate.

I take this opportunity of stating that I have lately paid some attention to the groups of the *Psittacidae*, and hope shortly to be able to give a sketch of them according to their natural affinities. I have therefore to request the assistance of my friends, whose kindness and whose resources will enable them to supply me with any information respecting this interesting family.

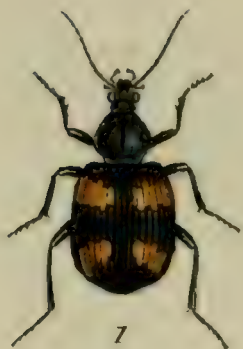
Subregnum. ANNULOSA.

Classis. MANDIBULATA. MacL.

Ordo. COLEOPTERA. Linn.

Tribus. CHILOPODOMORPHA. MacL.

Stirps. GEODEPHAGA. MacL.



Fam. CARABIDÆ. MacL.

Genus. PANAGÆUS. Lat.

TOMENTOSUS. *P. ater, tomentosus, elytris profunde sulcatis, fasciis duabus transversis dentatis aureo-flavis.*

Tab. 20. f. 1.

Corpus, pedes, antennæque valde tomentosi, intensé atrii. Thorax punctis impressus, lateribus margine reflexo. Elytra profunde sulcata, sulcis punctis impressis : fasciâ humerali subrectâ, aureâ, super sulcos septem extendente, apicali subsemicirculari, super sulcos sex extendente.

Long. corp. $\frac{19}{20}$; latit. $\frac{9}{20}$.

Habitat in Indiâ Orientali.

In Mus. Dom. MacLeay, nost.

This insect was one of the novelties brought to this country by Major Sale, in the valuable collection to which I have alluded in a former number of this Journal, as having been formed by that gentleman in the immediate vicinity of Madras. It is nearly allied to *P. angulatus* of Olivier; but may be at once distinguished from that insect, by being considerably tomentose, and also somewhat larger.

Stirps. NECROPHAGA. Lat.

Fam. SILPHIDÆ. MacL.

Genus. NECRODES. Leach.

OSCULANS. *N. niger, elytris abbreviatis, fasciâ humerali obliquâ, apicalique transversâ irregulari, ferrugineis.*

Tab. 20. f. 2.

Antennæ nigræ, apice ferrugineo. Caput, thoraxque nigri, glabri, punctis minimis aspersi, hoc subconvexo, posticé utrinque inciso. Scutellum ferrugineo-nigrum, subrugosum, medio longitudinaliter sulcatum. Elytra inter fascias subferruginea, subrugosa, lineis elevatis tribus longitudinalibus instructa; fasciis ferrugineis crucem simul fere formantibus. Pedes nigri, punctis minimis aspersi; tarsis pilis ferrugineis instructis; femoribus subtumidis, haud dentatis; tibiis rectis.

Long. corp. $1\frac{1}{20}$.

Habitat in Indiâ Orientali.

In Mus. nost.

This also is one of the uncharacterized insects which came over to this country in Major Sale's cabinet. It was unique in the collection. Those observers of Nature, who take a pleasure in tracing the gradation of the affinities which connect her conterminous groups, will meet an interesting subject of contemplation in the insect before us. It immediately connects the two adjoining genera of *Necrophorus*, Fab. and *Necrodes*; having the general form, and the *antennæ* of the latter group, with the *elytra* of the former. The most important of its generick characters bring it within the circle of *Necrodes*, while in the distribution of its colours, as well as in the brevity of the *elytra* and the mode in which they are truncated, it assumes the appearance of *Necrophorus*. I have named it in conformity with its osculant situation between the two genera.

Tribus. LAMELLICORNES. Lat.

Stirps. PETALOCIDA SAPHOPHAGA. MacL.

Fam. SCARABÆIDÆ. MacL.

Genus. ONTHOPIAGUS. Lat.

IGNEUS. *O. nigro-cyaneus, capite thoraceque igneo-rubris, elytris atris, antennis ferrugineis.*

Tab. 20. f. 3.

Caput thoraxque subrugosi, rubro-ænei. *Elytra* glabra, lineis septem punctatis instructa.

Long. corp. $\frac{9}{25}$, lat. $\frac{3}{25}$.

Habitat in Indiâ Orientali.

In Mus. nost.

A single specimen of this insect was found in the same collection as the two preceding species. It is particularly remarkable for the brilliancy of the head and *thorax*, which assume a fiery appearance, contrasted with the dull black of the *elytra*.

Genus. MNEMATUM. MacL.

RITCHII. *M. nigronitidum capite punctato vertice depresso, thorace latissimo punctato, elytris atris subsulcatis.* MacL.

Mnematum Ritchii. Mac L. in Hor. Entom. V. 1.
pt. 2, p. 506.

Tab. 20. f. 4.

Long. corp. $\frac{3}{4}$; lat. $\frac{1}{2}$.

Habitat in Africâ Boreali, Mourzouk.

In Mus. Brit., Dom. MacLeay, nost.

The more profound votaries of Entomology need not be informed that the above insect, now figured for the first time, is one of the rarest and most interesting of the Class. It is the species of which the discovery afforded so much satisfaction to the distinguished authour of "*Horæ Entomologicæ*," as supplying the chasm that previously intervened between his groups of *Helioctanthus* and *Pachysoma*; and which thus confirmed the justness of his views, and the correctness of his conjectures, as to the natural affinities of the family of *Scarabæidæ*. The three specimens enumerated in the above collections are all that are at present known; that in the British Museum having been sent home by the late lamented Mr. Ritchie; and the other two having constituted part of the collection formed by Capt. Lyon, R. N., who accompanied the former traveller in his unfortunate expedition into Africa.

Genus. PHANÆUS. Mac L.

KIRBYI. *P. splendide viridis, capite apice atro, subbidentato, thorace glaberrimo, elytris longitudinaliter sulcatis, antennis ferrugineis.*

Tab. 20. f. 5. mas. f. 6. fæm.

Mas. *Capitis cornu atrum, curvatum, thoracis vix longitudine. Thorax nitidus depressus inermis, angulis posticis subobtusis, margine reflexo; punctis posticis nullis. Elytra glabra, sulcata,*

subnitida. *Tibiæ* anticæ quatuor dentibus instructæ, tribus anticis acutis, quartâ feré obsoletâ.

Long. corp. $\frac{9}{10}$; lat. $\frac{1}{2}$.

Fæm. *Capitis* cornu feré obsoletum. *Thorax* glaber, convexus, lineâ elevatâ brevi transversâ, duobusque tuberculis mediis parum elevatis nigris instructus; angulis punctisve nullis. *Elytra*, *tibiæque* anticæ ut in mari.

Long. corp. $\frac{8}{10}$; lat. $\frac{1}{2}$.

Habitat in Brazilâ.

In Mus. nost.

This insect belongs to Mr. Mac Leay's fifth form of the genus *Phanæus*, of which the well known North American species *P. carnifex* is the type. But though it agrees with that division in the essential points of the form of the *thorax* and the *pectus*, it evidently deserts the typical character, and evinces an approximation to the first form of the same genus, represented by *P. bellicosus* and *lancifer*, in the emargination of the *clypeus*, and the appearance, although nearly obsolete, of the fourth tooth on the anterior *tibiæ*. Other species in Mr. MacLeay's cabinet complete this circle of affinities. This species, therefore, affords much interest to the inquirer into affinities, by thus adding a further illustration of the gradual process by which nature passes from one form into another.

I have named this insect in honour of the distinguished authour of the "Monographia Apum Angliæ," whose experience and valuable instructions have been among my best guides in Entomology, and whose friendship and kind encouragement among my chief supports in my advances through the science.

Stirps. PETALOCERA, THALEROPHAGA. Mac L.

Fam. MELOLONTHIDÆ. Mac L.

Genus. EUCHLORA. Mac L.

MAC LEAYANA. *Eu. pallidé virescens, capite thoraceque punctis aureis confertis splendentibus; elytris punctatis flavo-marginatis; corpore subtus pedibusque aureo-cupreis.*

Tab. 20. f. 7.

Antennæ aureo-cupreæ. *Corpus* subtus *pedesque* nitidé aureo-cuprei, albidé pilosi. *Clypeus* aureus. *Scutellum* nitidum, parcé punctatum.

Long. corp. $1\frac{3}{20}$; lat. $\frac{9}{40}$.

Habitat in Indiâ Orientali.

In Mus. Dom. Mac Leay, nost.

It is difficult to convey either by description or representation a just idea of the beauty of this superb insect, which formed one of the choicest ornaments of the Madras collection, to which I have so often alluded. It bears the name of a gentleman, the value and advantages of whose friendship will be better understood by an expressive silence, than by any vain attempt at acknowledgment.

Fam. RUTELIDÆ. Mac L.

Genus. PELIDNOTA. Mac L.

CYANIPES. *P. intensé viridis, glaberrimus, pedibus purpureo-cyaneis, antennis nigris.*

Tab. 20. f. 8.

Caput scutellumque punctis minimis conspersa. *Elytra* punctis longitudinaliter dispositis, ad humeros lateraque profundé impressis, in medio fere obsolete, instructa. *Pedes* punctis impressi, parcé pilosi. *Abdomen* superné rugosum, subtus punctis impressum, pilosum: segmento ultimo purpureo-cyaneo.

Long. corp. $1\frac{1}{2}$; lat. $\frac{3}{5}$.

Habitat in Brazilâ.

In Mus. nost.

The insect in my cabinet is the only specimen of this species that I could discover in a very extensive collection received some short time ago from the Brazils. It approaches very nearly to *P. glauca*; but is easily distinguished, not only by its deep green colour, but by the sculpture of its *elytra*, which are longitudinally punctured, while those of *P. glauca* are smooth.

Genus. RUTELA. Lat.

SUMPTUOSA. *R. viridis*, thorace glaberrimo sulco utrinque impresso, elytris subsulcatis, nitide cupreo-viridibus.

Tab. 20. f. 9.

Antennæ nigræ. *Thoracis* sulci punctis impressi. *Scutellum* glaberrimum. *Elytra* striis punctatis longitudinalibus instructa, inter strias subrugosa.

Long. corp. $\frac{13}{20}$; lat. $\frac{7}{25}$.

Habitat in Brazilia.

In Mus. nost.

My specimen of this insect also was unique in the same collection as the last. It forms a splendid addition to the genus *Rutela*, in which the colours are in general sombre.

[To be continued.]

ART. LXVI. *Description of the RIMAU-DAHAN of the inhabitants of Sumatra, a new species of Felis, discovered in the Forests of Bencoolen, by Sir T. STAMFORD RAFFLES, late Lieutenant Governor of Fort Marlborough, &c. &c. &c.—By THOMAS HORSFIELD, M.D. F.L. & G. Soc. &c.*

THE illustration of an animal, of which the notices have previously been imperfect and unsatisfactory, is in many cases equally important with the description of an entirely new subject. With this impression I gladly avail myself of a favourable opportunity which is afforded, of detailing, through the pages of the Zoological Journal, the result of my researches relating to a quadruped, which has hitherto very partially been made known to European Naturalists. This animal, the RIMAU-DAHAN of the inhabitants of Sumatra, was brought alive to England, in August last, by



Sir Stamford Raffles. Having been obtained while very young, in the forests of Bencoolen, it readily submitted to confinement. It likewise supported, without inconvenience, a protracted and tempestuous voyage, and was landed in excellent health: it is however a subject of regret, that its death was occasioned, apparently, by the combined causes of change of climate and of disease, connected with the process of dentition, to which it was subject about six weeks after arriving. But a sufficient opportunity was afforded, both during the voyage and its continuance in England, of noticing its manners and peculiarities.

There is however a peculiar interest connected with the history of the Rimau-Dahan, far exceeding that which arises from its importance in a scientific point of view. The destruction of the ship *Fame*, on the coast of Sumatra, has been a subject of universal regret, as well as of universal notoriety: but it is less generally known, that after returning to Bencoolen, stripped of the result of the labours of seven years, by an instantaneous and appalling calamity, Sir Stamford Raffles resumed his labours with unabated energy and ardour. During the short period of a few weeks, he succeeded in accumulating such a number of materials, of an interesting nature, as alone to entitle him to the rank of an eminent benefactor of science.

Among the subjects thus meritoriously brought together, I have the pleasure of enumerating the following:—*First*. The foetus in utero of the *Tapirus Malayanus*, and many other parts of this interesting animal, preserved in spirits.—*Secondly*. The subject of the present memoir, the RIMAU-DAHAN, or *Felis Macrocelis*,* a new species of the Genus *Felis*, equal in size to the Leopard, the first distinct notice of which was given by Sir Stamford Raffles in the Transactions of the Linnean Society. (See vol. xiii. p. 250). *Thirdly*. The *Felis Sumatrana*, also brought in a living state to this country.—*Fourthly*. Various specimens and skeletons of *Quadrumana*, among which is an interesting species of *Semnopithecus*.—*Fifthly*. A collection of prepared skins of Birds, containing several of the rarest Sumatran species.—*Sixthly*. Various

* The specific name was applied to it by M. Temminck, as will be shewn in the sequel.

specimens of the Corals from the coast of Sumatra, in very perfect state of preservation.—*Seventhly*. A Herbarium of Sumatran plants, of considerable extent.—*Eighthly*. Materials for further illustration of the genus *Rafflesia*, in every state of fructification, consisting of numerous specimens carefully preserved in spirits and in salt-water.—*Ninthly*. A very extensive collection of living plants; among which may be enumerated a new species of *Nepenthes*, and the *Rafflesia Arnoldi*. These were brought in a thriving state to St. Helena, where they were deposited, provisionally, in the Hon. East India Company's Botanic Garden.—*Tenthly*. A collection of drawings of a considerable number of the Quadrupeds, Birds, and Plants, of Sumatra. On the first-mentioned of these subjects, I am happy to have an opportunity of adding the following statement, from high authority. "It was from the Fœtus in utero of the Malayan Tapir, brought to England in spirits by Sir Stamford Raffles to Sir Everard Home (who had made a particular request to that purpose) the account was taken which that comparative Anatomist laid before the Royal Society in the Croonian Lecture, promulgating the existence of nerves in the navel-string and membranes, and those in the Tapir larger than in many other animals, so much so indeed, as to be readily distinguished by the naked eye."*

I proceed to a general description of the RIMAU-DAHAN, to which I shall add some remarks on its manners and history. The specific name of *macrocelis* has very appropriately been given to it by M. Temminck, who has just recently prepared an account of this animal for publication. On occasion of his visit to England, last April, M. Temminck communicated to me his description, in which the nature of his materials is candidly stated: he was at that time only acquainted with several prepared specimens, all more or less injured or defective, contained in the collections of Paris and Leyden.

The head of the *Felis Macrocelis* is proportionally small, somewhat attenuated, obtuse, and rather high in its vertical dimensions. The upper lip is full and distended, the lower lip is less swelled and projecting, than in several other species of this genus. The

* See p. 582 of the present number. ED.

termination of the muzzle is abrupt. The forehead is rather depressed and plane, and the nose but slightly elevated. The general aspect, even in a state of nature, indicates less ferocity than that of the Tiger or Leopard; the character of the eyes and the physiognomy have considerable resemblance to those of the Domestic Cat. On the upper lip and cheeks short whiskers, alternately of a white and black colour, are scattered; small fascicles of stiff hairs are also situated above the eyes. The ears are small and rounded. The teeth, as far as regards the generic character, present nothing peculiar: in the specimen before me, the second set of canine teeth is protruding, while the first still occupies its original situation. The neck is rather slender and of moderate length. In its general habit, our animal has much of the elegance and gracefulness of the Leopard: the form of the body is on the whole cylindrical; the breast and flanks have a moderate roundness, and not the flatness which is frequently observed in the Tiger, but in the character of the extremities, our animal resembles the latter species. The strength and robustness of the thighs, legs, and feet, afford a peculiarity to it, which has very properly been taken by M. Temminck, as the character of the species. The tail is of greater length and fulness than in any other species of *Felis* hitherto discovered: it is equal in length, to the body and neck together. The hairy covering of the tail, is longer and more delicate than that of the body; it increases in thickness towards the extremity of that organ, where it has a lanuginous texture. In general the animal is thickly clothed with fur, which is of moderate length, soft to the touch, and provided at the base with a soft down.

The ground colour of our animal is a whitish gray, inclining to cinereous or to brownish gray, and one of the peculiarities mentioned by Sir Stamford Raffles, is the almost entire absence of yellow or red in the external tint. On the upper portions of the neck and back, the tint is more purely cinereous; on the abdomen, the interior of the thighs, and the tail underneath, a slight admixture of tawny is observed in the fur, which appears to increase with the age of the animal. This ground is more closely covered, in the *Felis Macrocelis*, with spots and bands, defined posteriorly by

a deep black margin, than in any other of the large species of this genus with which I am acquainted. The black has, on the larger discolourations, most strikingly the appearance of velvet. The form of the marks is in the highest degree irregular, and even a detailed description can scarcely convey an accurate idea of them : I must therefore rely, in great measure, for their illustration, on the figure which accompanies this description. (tab. xxi.) The highest parts of the neck and back are marked throughout with two longitudinal bands, which, arising on the occiput between the ears, pass along the spine to the rump, and finally disappear near the middle of the tail. On the neck these longitudinal bands separate, and form a curve outward, their course is then nearly parallel, but in some individuals they meet in a single line on the back, and diverge again in a small degree on the rump. Two smaller bands, disposed within the principal pair, have nearly the same origin ; they extend along the highest portion of the neck, and are lost on the region of the shoulders. Here the large bands are interrupted by transverse spots of the ground colour. The breadth of the bands is not regular throughout ; they gradually increase in breadth towards the posterior portion of the neck, and, in their course along the spine, are occasionally interrupted by gray spots. Exterior of these two principal bands, a smaller band arises on each side, at the base of the ear, and passing along the neck, terminates in a curve on the shoulder. The cheeks and sides of the head are marked with two parallel bands, arising from the angle of the eye and from the mouth, and terminating under the ear. At this point a broad band has its origin, which passes transversely across the throat. Several oblong marks extend longitudinally along the neck, and unite near the breast with other marks, which have a transverse disposition. The upper lip is very elegantly marked with three or four dotted lines, and an interrupted series of oblong spots passes under the eyes towards the cheeks. The border of the mouth is black. The forehead at the sides is dotted, in the middle it is transversely marked with several partially interrupted curves, adjoining to which a large discolouration is disposed immediately behind the eyes, consisting of numerous semiconfluent spots, arranged in a circular manner.

The nose is delicately variegated with gray and black. The ears exteriorly are black, with an irregular gray spot in the middle of the lobe; interiorly these organs are gray, and covered with short hairs, disposed near the anterior margin in a small tuft.

The most distinguishing character is however afforded to our animal, by the marks on the shoulders, and on the sides of the body. These are oblong, irregular, of great breadth, transversely disposed and connected on the shoulders; interrupted and angular, on the sides and flanks. In all, the posterior margin has uniformly a deep velvet-black tint, and consists of a curved or irregularly waving line. The marks, on the shoulders and on the sides, are separated by narrow gray interstices, affording a tessellated appearance to the covering. But no uniform or determinate character prevails on the surface, and in different individuals a slight diversity appears to exist: I shall however describe them, from the specimen before me. Here the most conspicuous mark is placed on the shoulders, and extends from the longitudinal lines which pass along the spine, to the anterior extremities; it is oblong and broad above; about the middle, the posterior margin is contracted by a curve, and it is regularly rounded at its lower extremity; the anterior border is perfectly regular and transverse, but without any defined margin. Before this principal mark, another discolouration extends from the neck to the anterior portion of the fore-thighs: this is interrupted, in the middle, by several dots, from which the borders proceed in a waving direction; a third mark, less distinctly defined, is placed below the principal mark on the shoulders. On the sides of the body, from the shoulders to the rump, the marks are interrupted, and have a partially oblique disposition, but a distribution into three principal compartments can generally be traced; these however vary in different individuals. They are in all cases separated by transverse streaks, into smaller angular or rounded spots, by which the tessellated character above mentioned is produced. In the specimen now before me these lateral marks are subdivided and irregular: they were more connected in another specimen which will be mentioned in the sequel. In a skin contained in the Honourable East India Company's Museum, ob-

tained by Dr. Finlayson, they have considerable uniformity and a more oblique disposition. In this individual they distantly resemble the marks of the Bengal Tiger. On the rump and on the upper parts of the thighs, several series of marks are disposed in succession; the highest of these is nearly regular, and runs parallel to the spine, consisting of four or five spots; the second has a curved direction, and below this several irregular marks are scattered on the rump and thighs. In all these the character of a dark posterior border is preserved, but their contour is annular or elliptical, exhibiting a slight resemblance to the spots of the Leopard, and several marks of a similar character, are also observed on the flanks near the abdomen, below the principal transverse compartments. The lowest portion of the abdomen is marked with short, broad, transverse bands, disposed apparently without regularity. On the thighs the marks differ greatly in size and form; they consist chiefly of simple spots with an irregular margin, but in some cases several of these marks have an annular disposition, and a slight resemblance to the marks of a Leopard; their number gradually decreases towards the feet. The interior of the thighs, near the abdomen, is marked with broad spots, forming on each thigh, several interrupted lines; below these small dots are irregularly scattered. The feet are uniformly gray. The tail is marked with less regularity in the *Felis Macrocelis*, than in most other species of this genus: on the base and beyond one third of its length, the parallel longitudinal bands are continued; the upper portion of this organ is covered with broad black bands, not regularly disposed; the under part, near the base, has several broad black spots, which meet the superior bands, but without regularity; beyond the middle of the tail, the bands have an oblique disposition, and they are gradually obscured and lost towards the extremity, where this organ has a grayish tint, with a slight admixture of tawny. The claws are robust, they are completely retractile, as in other species of this genus, and of a pale horny colour. The irides are yellowish.

The surface of the large marks of the *Felis Macrocelis* is covered with a mixture of gray and black hairs, among which small black dots are distributed; the anterior margin is in

most cases without any defined boundary, while a distinguishing character of our animal is afforded by a deep velvet-black margin which confines the spots posteriorly.

The following are the dimensions of the subject now described, which was a female :

| | Ft. | In. |
|--|-----|-----|
| Length of the body and head, from the extremity
of the nose to the root of the tail | 3 | 0 |
| Length of the tail | 2 | 8 |
| Height at the shoulders | 1 | 4 |
| Height at the rump | 1 | 3 |
| Circumference of the abdomen | 2 | 0 |
| Circumference of the neck | 1 | 2 |

To this detail of the dimensions of the *Felis Macrocelis*, I am enabled to add various interesting remarks, kindly communicated to me by Sir Stamford Raffles, which will shew the size our animal acquires in a state of nature, and illustrate several points in its external appearance. "A small RIMAU-DAHAN lost in the Fame, which had been living in my possession about ten months, and might have been four months old, when he first came into my possession, attained a size of about one-third larger than the specimen which was brought to England last August, (the subject described in the present Essay.) The colours and marks were nearly the same, but more defined, and nothing yellow or red about it, the black having a striking velvety appearance. The tail was longer and more bushy than in the latter specimen. This was obtained a few days before I last left Bencoolen in April. It was then smaller than the common Tiger Cat, and only distinguishable from that animal, by the length of the tail, breadth of the paw, and colours. The natives assert that they do not attain a much larger size than the first specimen, and perhaps the full size of the wild and full-grown animal may be fairly taken as half as large again as the present specimen." These remarks are confirmed by Mr. Cross of Exeter-Change, who has had much experience in bringing up Leopards and other large species of this genus. Judging from the age at which the animal died, which was before the process of dentition was completed, Mr. C. thinks it had acquired about two-thirds of its size and bulk.

To the preceding remarks on the dimensions of the Rimau-Dahan, Sir T. S. Raffles has added the following particulars regarding its manners: "Both specimens, above mentioned, while in a state of confinement, were remarkable for good temper and playfulness; no domestic kitten could be more so; they were always courting intercourse with persons passing by, and in the expression of their countenance, which was always open and smiling, shewed the greatest delight when noticed, throwing themselves on their backs and delighting in being tickled and rubbed. On board the ship there was a small Musi Dog, who used to play round the cage and with the animal, and it was amusing to observe the playfulness and tenderness with which the latter came in contact with his inferior sized companion. When fed with a fowl that had died, he seized the prey, and after sucking the blood and tearing it a little, he amused himself for hours in throwing it about and jumping after it in the manner that a cat plays with a mouse before it is quite dead."

"He never seemed to look on man or children as prey but as companions, and the natives assert, that when wild they live principally on poultry, birds, and the smaller kinds of deer. They are not found in numbers, and may be considered rather a rare animal, even in the southern part of Sumatra. Both specimens were procured from the interior of Bencoolen, on the banks of the Bencoolen River. They are generally found in the vicinity of villages, and are not dreaded by the natives, except as far as they may destroy their poultry. The natives assert that they sleep and often lay wait for their prey on trees; and from this circumstance they derive the name of *Dahan*, which signifies the fork formed by the branch of a tree, across which they are said to rest, and occasionally stretch themselves."

"Both specimens constantly amused themselves in frequently jumping and clinging to the top of their cage, and throwing a somerset, or twisting themselves round in the manner of a Squirrel when confined, the tail being extended and shewing to great advantage when so expanded."

The remarks which I made during the period of the confinement of the Rimau-Dahan in Exeter-Change, agree strikingly with this

communication. On its first arrival, and for about ten days, the animal was shy, and shewed considerable symptoms of ferocity. One of its attitudes is exhibited in the figure, which is taken from a drawing made by William Daniell, Esq. R. A. a few days after it had been placed there. This indicates more wildness of aspect than it afterwards exhibited. The strangeness of its situation, the noises which it heard in the menagerie, the novelty of the scenes around it, as well as of the attendants, doubtless influenced its manners, alarmed it, and in some degree caused it to resume its natural fierceness, which had previously been subdued by kind treatment. But after eight or ten days' confinement, the animal became mild and tractable: it now allowed itself to be caressed, and soon became perfectly familiar, and fond of the company of the persons employed in the menagerie. It was very playful, and rolled itself about when it was noticed and caressed. Our animal, while it continued at Exeter-Change, appeared rather less voracious than a Leopard; it was fed with beef and the heads of fowls.

In giving an account of the Rimau-Dahan, I have been led to the examination of a species of *Felis*, recently made known by E. Griffith, Esq. in his "*Description of Vertebrated Animals*." It here has the name of *Felis Nebulosa*, the *Chinese* or *Tortoise-shell Tiger*; in the translation of the *Règne Animal* of Baron Cuvier, in which Mr. G. is at present engaged, he has preferred the English name of *Clouded Tiger*. The *Felis Nebulosa*, Gr., in the work first mentioned, is described as equal to the Bengal Tiger in the bulk of his body and size of his head. Two separate figures are given by the same author in the works above cited, the first of which was drawn by Howitt. The *Felis Nebulosa* was said to have been brought from Canton, but Mr. Griffith regrets that the animal was not described during life. After a careful consideration of both the figures, and of the description given by Mr. Griffith of the *Felis Nebulosa*, and after numerous and repeated comparisons of these with the specimen, it has appeared to me, that no small degree of doubt remains, whether the animal figured by Mr. G. and the Rimau-Dahan, be the same; and it would therefore, in my opinion, not be consistent

with the precision required in determination on subjects of Natural History, to apply to our animal the name of *Felis Nebulosa*.

For adopting the name given to our animal by M. Temminck, I have stronger grounds. In this no doubt remains as to the identity of the subjects from which the description was made. On occasion of his visit to England, in April last, M. T. had an opportunity of comparing his description, with a skin of the *Felis Macrocelis*, preserved in the Museum of the Hon. East India Company. This was forwarded to England by Dr. Finlayson, but without any precise notice regarding its native country. This skin agrees with the specimen from Bencoolen, in the marks on the head, neck, back, and shoulders, and in the length, fulness, and colouring of the tail. The marks on the body have generally the same character, but they are more regular, connected, and obliquely disposed. On the rump, thighs, abdomen, and extremities, the colouring is very similar in both. In the account which M. Temminck has prepared for the public, of the *Felis Macrocelis*, he states that it is indicated succinctly by Sir Stamford Raffles in his descriptive Catalogue of a Zoological Collection made in Sumatra; and he adds the following information as to its distribution through the Indian Archipelago. “On le trouve aussi a Borneo, ou les Daiakkers, peuplade sauvage et sanguinaire de cette isle, emploient la peau pour en faire des jacquettes, dont ils garnissent les bords, des plusieurs rangs de coquillage blancs.”

An individual of the Rimau-Dahan is said to have been brought to England from Bencoolen, about ten years ago. It was distinguished on board of the vessel in which it arrived, by the name of the *Fox-tailed Tiger*. This was subsequently exchanged for that of *Tortoise-shell Tiger*. This individual was described to me as nearly of the size of a Leopard, but it had the same proportions in its body and extremities as our specimen, being rather of more robust make than that animal, and less elevated. Its legs, feet, and claws, were very stout, and it was provided with a long and very full tail. This so called *Fox-tailed Tiger* was exhibited for some time at Exeter-Change: it afterwards formed part of a travelling menagerie, and died at Axminster. The skin was prepared, by tanning, but not set up, and was sent to the

Egyptian-hall, where it was exhibited for some time ; but I have not been able to learn its final disposal, or to find any record of it in the sale of Mr. Bullock's Museum. In its manners this individual resembled the Rimau-Dahan ; it was comparatively mild and fond of play and society. From the length of the period during which it remained at the Menagerie, it may be supposed to have been full grown. It had acquired the usual size of a Leopard.

The following character will serve to distinguish the *Felis Macrocelis* from the other species of this genus, which have hitherto been described.

Felis grisea, maculis nigris: humeralibus maximis transversis; lateralibus obliquis subcoadunatis vel intervallis angustioribus divisis plagis angulatis rotundatisve rarius ocellatis; omnibus marginibus posterioribus saturatioribus, lineis cervice dorsoque summo duabus parallelis: collo utrinque duabus superiore continua inferiore interrupta, pedibus validis, podiis amplis robustis, cauda longissima incrassata lanuginosa.

Tab. XXI.

The superior strength of the extremities of the *Felis Macrocelis*, and the fulness and length of the tail, must be considered more important and essential characters of distinction, than the painting of the body. The divisions which have hitherto been attempted in this extensive genus, are founded alone on size, colour, and external marks ; they afford therefore little assistance in determining the situation of our animal in a natural arrangement, or in illustrating its affinity to the species that have hitherto been described. In point of size our animal is superior to the Panther, from which the Leopard has not as yet been clearly discriminated, but by the strength and size of its extremities it appears more nearly allied to the Tiger than either the Panther of the old world or the Jaguar of America : and agreeably to my views, our animal is nearer in affinity to the Tiger than the animals above mentioned. If colour alone might be considered in determining affinity in this genus, the analogy of the American species, would indeed suggest a different disposition. The *Felis*

Macrocelis would then be placed after the Panther, and lead the way to the numerous series of small species or Wild-Cats. Several distinct kinds of painting or of external marks, in the genus Felis, are exhibited on the ancient continent by the Lion, the Tiger, the Panther, and the animal now described. To the former or uniform coloured species the Puma or Couguar corresponds in America; the Panther is strikingly represented by the Jaguar. The Felis Macrocelis may be contrasted by the Ocelot in various particulars. This animal is proportionally less elevated on its legs than the large American species, it has broad transverse marks on the shoulders, the lateral discolourations are, in some degree, obliquely disposed, and a striking resemblance is likewise afforded by the dark margin which surrounds them. But this agreement of colour and marks in the animals of the two continents, is too vague to afford any illustration of the real affinity of our animal and of its place in the genus. I must therefore conclude with the remark, that most species of this genus, require a more careful examination, both of form and habits, than they have hitherto received. The peculiarities of the mode of life and manners of the Leopard, have by no means been satisfactorily detailed hitherto. The Felis Pardalis, the Hunting-Leopard or Guepard, exhibits several striking peculiarities of manners and of form, and among these the structure of its claws requires particular notice. The peculiarities of the Felis Macrocelis, which have been the subject of the preceding details, are doubtless accommodated to its existence, in a wild state, in the forests of Sumatra.

ART. LXVII. *Descriptions of some new Brazilian species of the Family of Laniadæ.* By GEORGE SUCH, Esq. of Magdalen Hall, Oxford.

HAVING, during the latter part of my residence in Brazil, directed my attention to the subject of Ornithology, and having had opportunities of collecting in different parts of the interior, parti-

cularly in some thickly wooded districts, which are only now becoming pervious, and into which no Naturalist has hitherto penetrated, I have met with a variety of birds, which I apprehend to be both new and interesting. Among others some species of *Laniadæ*, which I shall here describe, come from a situation, the character of which is extremely conducive to the occasional assemblage during part of the year, of great numbers of the feathered creation from the neighbouring parts; while it also affords a constant shelter to many birds whose habits are more congenial with the character of its deep and umbrageous recesses.

The situation to which I allude is that broad mountainous belt which forms the skirt of the table land of Brazil, at that part, where it rises from the low plains of Goaytacazes to the elevated surface of the Province of Minas Geraes. Here the scattered patches of wood growing in the moist hollows which are produced by the undulating surface of the extensive downs, afford but little shelter to the birds of more retired habits, although sufficient for others whose bolder character leads them to the neighbourhood of man, or whose formation is suited to flat or marshy localities. At one season of the year, however, when many of the numerous lakes become wholly dried up, the brooks diminished to trifling springs, and the shrubs exhausted of their berries, numerous families of birds, particularly those of the order *Grallatores*, make their way from the plains to the thick forests which cover the mountainous belt before mentioned; while others less timid draw nearer to the habitation of man, and plunder the gardens and orchards for their daily support. In a similar manner, many of the feathered tribes of the lower plains visit the same coverts, seeking a variety of berries, of which there is a constant supply even in the dry season, in consequence of the nature of the soil, which is kept continually moist by the mountain springs. These periodical accessions increase for a time the number and variety of the animal inhabitants of the wooded vallies, which are situated among the mountains that rise in successive ranges to the edge of the table land.

The commencement, however, of the rains causes the return of such species as have the more open lands for their usual resort;

and which thus resign the woodland solitudes to those whose habits are more constantly congenial with the forest shades. Among these last we find the *Solitary Yellow-crested*,* *White*,† and other *Woodpeckers*; the *Araponga*,‡ with its metallic note; the *Penelopes*, *Mutums*,|| *Macucas*,§ the *red and Blue Araras*,¶ with numberless others; as well as many quadrupeds, which it would be foreign to my present subject now to mention. I hope to have a future opportunity of adverting occasionally to some of the birds found in the before-mentioned situation. At present I beg leave to present the following description of some new species of *Laniadæ*, which I apprehend will be considered acceptable, inasmuch as they possess some of the characters of a genus of that family developed in the highest degree.

Fam. LANIADÆ. Vigors.

Genus. THAMNOPHILUS. Vieill.

SWAINSONII. *T. niger, fulvo-fasciatus, capite ferrugineo cristato.*
Tab. Sup. 5.

Rostrum mandibulâ superiore nigrâ, inferiore albâ. *Gula, genæ plumarumque* rhachides albæ. *Dorsi, abdominis, scapularumque* plumæ præcipue tri-fasciatæ. *Remiges* primores externæ fulvo-fasciatæ. *Rectrices* nigræ, externæ fulvo-fasciatæ.

* *Picus flavescens*, Gmel.

† Called by the Brazilians *Pec à pao branco*, i. e. White Woodpecker. This species appears to be the *Picus Melanopterus* of Prince Maximilian; and also the *black and white Woodpecker* of Dr. Latham, [Syn. Vol. iii. p. 393. ed. 2d.] or the "*Charpentier blanc et noir*" of Azara, [Voy. iv. No. 251.] The bird figured by Mr. Swainson, [Zoological Illust. pl. 38] under the name of *P. bicolor*, appears to be the female of this species, the male of which is distinguished by a yellow mark on the back of the head.

‡ *Casmarhinchos nudicollis*, P. Max. The note of this bird may be correctly termed metallic, since it bears the closest resemblance to the sound produced by the fall of a blacksmith's hammer on an anvil. The bird is consequently called by the Brazilians "*O Ferrador*," i. e. the blacksmith, in addition to *Araponga*, which is the name assigned it by the Aborigines.

|| *Crax Alector*, Linn.

§ *Tinamus Brasiliensis*, Lath.

¶ *Psittaci Macao* and *Ararauna*, Linn.

Pedes nigri, ungues pallidi. Longitudo corporis $8\frac{7}{10}$ Poll. rostri ad frontem $1\frac{7}{8}$, ad rictum 1; tarsi $1\frac{2}{10}$.

The name which is given to this bird, in Brazil, by the Portuguese, is *Sirizinho*; its habits, together with those of the others here described, are the same as mentioned by Mr. Swainson in his paper on the *Laniadæ*, in the last number of this Journal. I have designated this species by the name of that gentleman, whose observations have thrown so much light on this family.

MACULATUS. *T. ater, albo-maculatus, subtus albidus, abdomine infimo crissoque fulvo: rectricibus albo-fasciatis.*

Tab. Sup. 6.

Rostrum mandibulâ superiore nigrâ, tomis albis; inferiore albâ medio nigrâ. *Frontis remigumque* maculæ sub-fulvæ. Longitudo corporis 8; rostri ad frontem $1\frac{7}{8}$, ad rictum $1\frac{7}{8}$; tarsi $1\frac{1}{10}$.

I had originally conceived that my specimen was the first which had been brought to England; but I find a second in Mr. Mac Leay's collection; and which, although it differs in some points from my bird, appears to belong to the same species. Its chief difference, as has been pointed out to me by Mr. W. S. Mac Leay, consists in the *pectus* and *abdomen* being less white, and more of a lead colour than those of my bird; the spots also on the head are white, without any fulvous appearance, and the mandibles are altogether black. The native name of this bird is *Choca*.

VIGORSII. *T. (mas.) Dorso, alis, rectricibusque atris, fulvo latè fasciatis; corpore subtus albedo-brunnescente; capite rufo cristato, cristâ apice nigro.*

Tab. Sup. 7.

Rostrum valde compressum, nigrum; mandibulæ superioris tomis, inferiorisque apice, albis. *Gula* albida. *Genarum latera, pectus, abdomenque* albedo-brunnescentia. *Crissum* fulvum. Longitudo corporis 13; rostri ad frontem $1\frac{4}{10}$, ad rictum $1\frac{7}{10}$; tarsi $1\frac{8}{10}$.

T. (fæm.) *Capite cristato, dorso alis rectricibusque atris, albido-fasciatis : torque nuchali corporeque subtus cineraceis.*

Tab. Sup. f. 8.

Nucha obscuré nigro-fasciata ; ceteris mari similis.

These birds are the largest *Thamnophili* yet known, and they exhibit a developement of the general characters of the genus to the greatest extent. In the length and abrupt curvature of the *apex* of their bills, they approach very near to *Vanga*, Cuv. It is with great pleasure that I seize the first opportunity of publicly expressing my gratitude to my friend Mr. Vigors for the liberal and friendly instruction which I have received from him in my studies in Natural History, by distinguishing this species by his name.

LEACHII. *T. ater, capite, dorsoque albo-maculatis, remigibus fulvo-subfasciatis ; gula, pectore, abdominis medio, rectricibusque nigris ; abdominis lateribus uropygioque albo-fasciatis.*

Rostrum pedesque nigri. Longitudo corporis $10\frac{2}{5}$, rostri ad frontem 1, ad rictum $1\frac{1}{16}$; tarsi $1\frac{1}{2}$.

β. *Abdomine toto crissoque albo-fasciatis, rectricibus albo-sub-fasciatis.*

γ. *Multo minor.*

I have described the above three birds as varieties, although from the circumstance of the species of the *Thamnophili* bearing a considerable approximation to each other in appearance, I conceive that they may at some future time be found distinct. I had not an opportunity of examining the sex of these birds ; but I have reason to suppose them to be females, having been informed by the Brazilians that the male has a crest. Dr. Leach has described a bird under the name of *L. lineatus*, which bears some resemblance to the present species ; but which may at once be distinguished from it by the white markings forming slender *fasciæ* instead of spots. I have named this species after the above celebrated Naturalist, whose attention to this family entitles him to



that distinction. The name given by the Aborigines to this bird is *Pruayara*.

RUFICEPS. *T. niger, fulvo-maculatus, capite fulvo-lineato.*

Rostrum pedesque nigri, illius mandibulæ inferioris myxa albida.

Remiges secundariæ, uropygium, rectrices, abdomenque inferius fulvo-fasciatæ. Longitudo corporis $9\frac{1}{2}$; rostri ad frontem $\frac{9}{10}$, ad rictum 1; tarsi $1\frac{1}{2}$.

NIGER. *T. niger, capite cristato, remigibus sub-brunnescentibus obscuré sub-fasciatis.*

Capitis crista intensè atra; rostrum pedesque atræ. Longitudo corporis $8\frac{1}{2}$; rostri ad frontem $\frac{4}{5}$, ad rictum $1\frac{1}{10}$; tarsi $1\frac{1}{5}$.

Genus. **DRYMOPHILA.** Swainson.

VARIEGATA. *Dorso olivaceo-brunneo: capite, alis, rectricibusque nigris albo-variegatis; pectore, abdomine, uropygioque rufis.*

Rostrum atrum, mandibulâ inferiore pallidâ. Caput nigrum, superne albo-sublineatum, supercilio et regione paroticâ albis. Ptilla, pteromataque atra apice albo. Remiges primores fusco-atræ, externæ fulvo-marginatæ. Rectrices duæ mediæ maculâ parvâ apicali albâ, cæteræ maculâ grandi apicali, instuctæ. Tarsi, unguesque sub-pallidi. Longitudo corporis $4\frac{4}{5}$.

ART. LXVIII. *Description of the Vespertilio Pygmæus, a new species, recently discovered in Devonshire by Dr. LEACH.*

WE give the following concise character and description of a species of *Vespertilio*, which has recently been discovered, by Dr. Leach, in Devonshire.

Dr. Leach, who with great liberality, forwarded a specimen to one of the Conductors of our Journal, considers it as a new species, and states in the Letter, dated October 12, 1824, accompanying the specimen :

“ I have named it *Vespertilio Pygmæus*; it was taken at Spitchweek, near the forest of Dartmoor, where it is extremely common. The specimen sent is a female, and had milk in its mammæ. All that I have seen are nearly of the same size.”

VESPERTILIO PYGMÆUS.

V. capite alto, rostro brevi obtuso sulco frontali exarato, auriculis capite brevioribus basi latis apice obtusis rotundatis, trago lineari simplici, vellere molli brevi fusco capite dorsoque summo saturatiore subtus pallidiore canescente, cauda elongata apice nudiuscula e membrana interfemorali paulisper exserta.

Dimensions.

| | INCHES. | LINES. |
|---|---------|--------|
| Entire length of the body and head | 1 | 2½ |
| Length of the head | 0 | 5 |
| Length of the ears | 0 | 4 |
| Length of the tail..... | 0 | 9 |
| Extent of the flying-membrane carefully
measured along the bones of the arm
and phalanges | 5 | 4 |

Description.

Head high in its vertical dimensions; rostrum short, obtuse, nearly of equal breadth throughout, very gradually attenuated to the nose, which terminates abruptly, and is short and broad; nostrils small, opening laterally; forehead marked with a longitudinal furrow. Ears shorter than the head, broad at the base, obtuse and rounded at the extremity; the anterior margin nearly straight, the posterior slightly concave and convolute; tragus about one-half of the length of the auricle, regularly linear, simple and rounded at the extremity. Face covered rather scantily with a very short down, and without any lengthened bristly hairs. Tail

as long as the body, exclusive of the head, enveloped with the interfemoral membrane, excepting about one line of the tip which is naked. Flying-membrane of a dark brown colour: interfemoral membrane capable of great expansion by lateral cartilages, very gradually attenuated to a very short apex.

The head and body are covered with a very short delicate fur of a dark brown colour on the upper parts, paler and inclining to gray underneath. The tint is deepest on the head, and on the highest part of the back, along the spine. The claws of the posterior extremities are comparatively broad.

One specimen only of this species of *Vespertilio*, has as yet been obtained, and a more complete detail of its peculiarities remains to be given in one of our future numbers.

Of the various species of this genus, which have hitherto been described, our animal most nearly resembles the *V. pipistrellus*. But it differs in various particulars. It is not only considerably smaller in its dimensions, but it is also distinguished by the form of the tragus which is linear and simple, and by the tip of the tail which is naked, and projects slightly beyond the interfemoral membrane. The relative proportions of its head, body, and tail, are also different. The indication of an Egyptian variety of the *Vespertilio pipistrellus* by Geoffroy, which Desmarest is inclined to consider a distinct species, renders it probable, that the smaller *Vespertiliones*, even in Europe and the neighbouring territories, are not as yet examined with sufficient accuracy, and that new species, allied to each other in external appearance, remain to be discovered.

ART. LXIX. *Analytical Notices of Books.*

The Transactions of the Linnean Society of London. Vol. xiv. Part the Second, 4to, pp. 223. (171—394.) *With five Plates.*

THE Papers contained in the present portion of a volume embrace the proceedings of the Linnean Society, during 1823, and

parts of the preceding and following years, and are many of them well adapted to advance materially the progress of Natural History in its various departments. Those connected with Zoology are six in number, four of which are from the pen of the Rev. Lansdown Guilding, one from that of Mr. W. S. MacLeay, and the remaining one from that of Mr. Hogg. The analysis of these which we propose to offer, will enable the reader to appreciate justly the value and importance of the information which they contain.

“The natural History of *Xylocopa Teredo* and *Horia maculata*; by the Rev. Lansdown Guilding,” comprises descriptions of these insects, which have long been well known, but the account of which is rendered interesting by the accompanying observations relative to their manners and habits. The sexes of *Xylocopa Teredo* differ considerably in colouring; that of the male?, the *Apis Brasilianorum* of Linnæus, being yellowish red above and blackish beneath; while the female, *X. Morio*? Fab. Syst. Piezat., is throughout of the deepest black. This species inhabits the dried trunks of trees, perforating them in a longitudinal direction to form nests, which are never confused, though frequently scarcely separated from each other, and are divided by a ring of wood into distinct cells, filled with a mixture of honey and pollen, a single egg being glued to each of them. These cells are also inhabited by the larva of *Horia maculata*, Fab. which probably frequents them for the sake of the nutriment provided for that of the *X. Teredo*, to whose parent it frequently falls a victim. When full-grown, the larva of the *Horia* appears to excavate for itself a cell, (differing in form from those occupied by the *Xylocopa*,) in which it passes through its pupa stage. Figures of the larvæ, pupæ, and perfect state of both insects are given in illustration of this paper, together with a section of a portion of wood perforated by the *Xylocopa*.

The results of the succeeding Paper, “On the Nature of the marine production, commonly called *Flustra arenosa*; by John Hogg, Esq.” are calculated to remove this substance from the position which it has hitherto held in the classification of animated nature. Each of the cells which it contains is occupied, according

to Mr. Hogg's observations, by one or two very minute shells, which proved, on being hatched, to be the young of the *livid Nerite* of English Collectors, which, in conformity with their usual practice, has been referred in the present paper to the *Nerita glaucina*. The *Nerita glaucina* of the writers on British Conchology, is, however, certainly not that of Linnæus, but is probably the shell described by Lamarck under the name of *Natica monilifera*; while its variety, as it has been termed, which is the shell examined by Mr. H. and figured in the illustrative plate, appears to be the *N. collaria* of the same authour. When sufficiently grown, the young animal forces its way through the under surface of the agglutinated sand, which forms the substance under examination, leaving a small opening into the cell which it has quitted. From these circumstances, Mr. Hogg concludes, that it is "evident that it cannot be referred to the genus *Flustra*, but is rather to be considered as the matrix of *Nerita glaucina*, [of the English writers,] in which the embryo shells are retained and preserved until they have arrived at sufficient growth to obtain nourishment for themselves, and to support an independent existence." The figures of this production, of the minute shells contained therein (magnified), and of the young of that variety of *N. glaucina*, as it is termed, which has been alluded to above, appear strongly to support these results.

The "Description of a new species of *Onchidium*; by the Rev. Lansdown Guilding," comprises an enumeration and distribution of the species previously described of this singular and interesting genus of Mollusca, which it is however unnecessary to quote; since, founded on external characters alone, it by no means accords with the arrangement recently proposed by De Blainville, in the *Dictionnaire des Sciences Naturelles*, upon truly natural principles. With this arrangement, Mr. Guilding could not have been acquainted at the time of writing the present paper, or, ready as he is at all times to adopt those improvements which the progress of natural science is daily making, he would, we entertain no doubt, have agreed with that excellent Naturalist, in confining the true *Onchidia* to the semi-aquatic fresh-water species, and placing them near *Limax*, while the maritime ones are referred to

a new genus, *Peronia*, which occupies a place in the system near *Doris*, to which it is connected by a new osculant genus, *Onchidoris*. The new species described is

O. occidentale, dorso fusco atomis brunneis elevatis sparsis, ventre pallido : lateribus livido-maculatis, brachiis apice divisis.

This species is figured in the Transactions, and inhabits moist elevated places in the island of St. Vincent, lying hid during the day under stones, in a contracted form. Its eggs, about twenty in number, oblong elliptical, yellowish, gelatinous, connected by a filament and rolled together into a ball, are deposited in shady places. In its very young state, the animal is pale, with the neck and tail blackish.

“An account of some rare West Indian Crustacea,” by the same authour, contains descriptions of several new species arranged according to the system adopted by Dr. Leach in his excellent works upon this subject, several of whose generic characters the Rev. Lansdown Guilding has been enabled to correct and improve, from the opportunities he possessed of procuring recent and perfect specimens. Thus to the generic character of *Homola*, *Leach*, the following addition becomes necessary, “*Antennæ externæ infra oculos insertæ, longitudine corporis, filiformes, articulis duobus basilaribus valde elongatis, primo crassiore, secundo apice recurvo setigero.*” Of this genus, a new species, rather larger than the *H. spinifrons*, is thus described

H. spinipes. ♀. *H. rubescens*, testâ totâ femoribusque spinosis hirsutis, pedibus anticis majoribus spinosissimis : digitis nigris.

A new and common species of *Macropodia*, *Leach*, is also characterized

M. occidentalis. *M. olivacea* tota hirsuta, antennis setigeris rostro longioribus, collo tumido, unguibus internè spinosis.

Of a new species of *Leptopodia*, *L. ornata*, the following character is given :

L. ornata. *L. rufescens*, testâ utrinque lineis octo longitu-

dinalibus sanguineis anticè coalescentibus, *maris* pedibus 2 anticis scabris, digitis purpureis; posticis 8 anticè spinosis.

And the possession of both sexes furnishes the following correction of the generic character as given by Dr. Leach,

“*Cauda maris* 6-articulata: *feminæ* 5-articulata, articulo ultimo ferè magnitudine corporis (quod mirum,) reliquis minutis.”

Scyllarus carinatus, another new species, is characterized as *S. rufescente-vitreus*, lateribus obscurè crenatis, testâ caudâque carinatis.

An amended character is also given for *S. æquinoctialis*, *Fabr. Supp.*

The paper concludes with a new species of *Ibacus*,

I. ciliatus. *I. nigro-flavescens*, purpureo varius, corpore verrucoso: verrucis ciliatis, testâ utrinque ante fissuram 2-dentatâ, posticè 6-dentatâ:

and the ascertaining the locality of *Atya scabra*, Leach, which occurs in incredible numbers in the mountain streams of St. Vincent's, where it is caught by the negroes in baskets for the market.

In the “Observations on some of the Terrestrial Mollusca of the West Indies;” from the same pen, we are presented with characters of the animals that form several shells common in collections, but the inhabitants of which have remained hitherto undescribed. This laudable direction of his studies to the inhabitants rather than to their habitations, will enable the writer to add much and valuable information to that already possessed on this subject, (the importance of which is becoming daily more extensively acknowledged); and in other cases doubtless, as in one instance in the present paper, to refer to their proper genera, shells which from ignorance on this point had been previously wrongly located. We allude to the *Carychium undulatum*, *Leach.* the *Auricula Caprella*, *Lam.* to neither of which genera is the animal referable, as both of these possess only two tentacula, while the inhabitant of the shell in question offers four. It has, therefore, been necessary to establish a new genus to receive it, which has

been done by the Rev. Lansdown Guilding, under the name of CAPRELLA, and to which he has assigned the following character :

Testa dextera “ ovalis, spiralis, spirâ elevato-obtusâ : anfractibus duobus ultimis maximis ; os integrum elongatum : labium internum uniplicatum, infra medium cavernoso-inflexum : externum incrassatum marginatum.”

The animal of this species is described, as are also those of *Helicina fasciata*, *Bulimus hæmastomus*, (the shell of which is subdiaphanous when young and covered with an epidermis, but becomes pale as this is worn off and the animal approaches to maturity,) and of *Bulimulus stramineus*, a new species, “ Testâ tenerâ, totâ stramineâ, transversè obscuro-densè striatâ : anfractibus sex.” To the generic character of *Helicina* is to be added, “ Tentacula duo setiformia ; oculis radicalibus ;” and to that of *Bulimulus*, “ Tentacula 4, duo superiora longa oculis terminalibus : operculum nullum.”

The papers which we have just noticed are highly creditable to their industrious authour, and we cannot omit this opportunity of observing that the most beneficial results would be derived to Natural Science, if other gentlemen residing in our distant colonies and possessions, would follow the example which he has thus set before them.

The only remaining article, which it comes within our scope to notice, is one “ On the Insect called Oistros by the ancient Greeks, and Asilus by the Romans : by W. S. MacLeay, Esq. ;” who justly observes that “ the determination of the animals and plants, mentioned by the ancient writers, must always be a pleasing subject of research, tending, as it does, not merely to our better comprehension of the meaning of these authors, but also to our better acquaintance with the mysteries of nature.” For this investigation, in those departments of Natural History to which he has devoted his attention, no one can be better qualified, by classical as well as zoological attainments, than the authour of the present paper, which presents so closely connected a chain of argument and illustration, as to render it extremely difficult to analyse. We shall, therefore, merely observe, that Mr. MacLeay considers the insect

in question to be "some species of the modern genus *Tabanus*, probably the *Tabanus bovinus*, Linn." With the insect,

cui nomen Asilo
 Romanum est, *Œstron Graii* vertere vocantes;
 Asper, accerba sonans,———

the poet Dryden appears to have been better acquainted than most of the modern Naturalists, since he thus renders the above passage,

Œstros the Grecians call, *Asilus* we:
 A fierce, loud-buzzing *breeze*;———

This, if we may trust Mouffet's description, is the English synonyme for the *Hæmatopota pluvialis*, (a *Tabanus* of Linnæus,) which approaches much more nearly to the modern *Tabani*, than to the *Œstrus* of the great Swedish master and his successors in Entomology; which latter in no one respect, except in its being dipterous and infesting cattle, at all corresponds with the attributes assigned to the ancient *Œstrus* by the Greek and Roman poets and tragedians.

Transactions of the Geological Society. Second Series.
 Vol. i. Part the Second. 4to. pp. 279 (175—454),
 with twenty-five plates.

CLOSELY connected as many of the articles contained in the present volume are with the studies of the Zoologist, there are none we apprehend which he will peruse with so much interest as those that relate to the *Plesiosaurus* and the *Megalosaurus*, by the Rev. W. D. Conybeare and Professor Buckland. The former gentleman, it will be remembered, had from detached bones, procured even from distant localities, collected together a number of facts, which induced him to publish in the *Geological Transactions* for 1821, an account of a new fossil genus of *Reptilia*, under the denomination of *Plesiosaurus*. It was natural, he remarks, that many persons should have suspected that by the juxtaposition of incongruous members he should have been led to

constitute a fictitious animal; but the question is now completely set at rest by the discovery of an almost perfect skeleton, confirming, in nearly every essential particular, the opinions formerly advanced by him on this subject. Through the numerous and extensive details into which this magnificent specimen enables him to enter, it would be impossible and even needless for us to follow him, since those who are interested in the inquiry will doubtless consult the original paper; but one most singular feature of the organization of the animal in question cannot be passed over in silence. Previously to the recent discoveries of fossils of this class, the number of the cervical vertebræ had been regarded as small in all quadrupedal animals; those of the Mammalia, with the single exception of the Tridactyl Sloths, being exactly seven, Reptiles possessing from three to eight, and Birds alone varying from nine to twenty-three. The Ichthyosaurus however, which possesses eighteen, first evinced a deviation from these general rules, which appears to have reached its maximum in the Plesiosaurus, where the number of the true cervical vertebræ is thirty-five, or, including the anterior dorsal which are placed before the humerus, forty-one. This extraordinary elongation of neck, assimilates the Plesiosaurus less to Fishes, in which the sternum, as admirably illustrated by Geoffroy de St. Hilaire, is thrown forwards, though destined to move in the same element with them, than to Birds, in which this portion of the skeleton is thrown backwards; and will strongly excite the attention of the philosophic Naturalist. The reverend authour conjectures that the animal may have swam upon the sea, to which element the form of its paddles assigns it, with its long neck arched backwards, like that of the swan, ready to dart down at the fish which came within its reach; or that it might have lurked in shoal water, hidden from the attacks of its enemies, and deriving from the flexibility of its neck a compensation for that want of agility in moving through the water which is to be inferred from its organization. The head of this species, (which the authour denominates Plesiosaurus Dolichodeirus, from its most distinguishing characteristic, the length of its neck), is less than one-thirteenth of that of the body, while in the Ichthyosaurus its proportion is one-fourth.

The "Notice on the *Megalosaurus*, or great fossil Lizard of Stonesfield," by Professor Buckland, is necessarily much more imperfect than the article just quoted, as only a small portion of the osteology of this immense animal has yet been met with. We have therefore to wait until some fortunate discovery shall cast upon this subject the same light that has been already thrown on the former; observing in the mean while that the dimensions of the animal to which the thigh bone contained in the Museum at Oxford belonged, must have been, according to the computation of Cuvier, upwards of forty feet long, and of a bulk equal to that of an Elephant seven feet high. A portion of another thigh bone from Cuckfield, Sussex, would double this calculation; but Professor Buckland, justly observing that the same proportions are not safely to be attributed to recent and extinct species, and that the longitudinal growth of animals does not continue in so high a ratio, calculates the length of this reptile at from sixty to seventy feet. It therefore fully merits the name of *Megalosaurus*, which has been applied to it. The most important fragment that has yet been discovered, consists of a portion of the lower jaw nearly one foot in length, which is interesting, as developing in a great measure its mode of dentition, and from which it is obvious that this part of the animal must have terminated in a flat, straight, and very narrow snout.

In an extract from the Minutes of the Society there is given an account of the discovery in the Charmouth diluvium of a very large Elephant's tusk, measuring along its curvature nine feet and a half, one foot six inches and a half in circumference at its larger extremity, and one foot one inch and three quarters at one foot five inches from its apex. Other notices connected with Zoology are interspersed through the volume, especially in the "Notes on the Geography and Geology of Lake Huron: by Dr. Bigsby;" which contain descriptions of several new species of *Orthocera*, and of various other organic remains.

British Entomology ; or, Illustrations of the Genera of Insects found in Great Britain and Ireland, &c. By John Curtis, F.L.S. Nos. vii.—xii.

IN enumerating the genera of British Insects illustrated in the numbers of this work quoted above, we shall omit all mention of the plants figured therein, as foreign at least to our purpose, and shall touch briefly on the Zoological portion of it alone. The Seventh number, with which the present series commences, contains, 1. *Aphodius villosus*, an extremely rare species, known as British only by a single specimen in the cabinet of Mr. Vigors. 2. *Acanthosoma hæmorrhoidalis* (*Cimex hæmorrhoidalis*, Lin.), which has been adopted by Mr. Curtis as the type of a new Genus, differing from the other Pentatomidæ by its two-jointed tarsi and the great length of the first joint of its antennæ, and whose name alludes to the singular conformation of the spined keel beneath the abdomen, which seems to protect the rostrum. 3. *Sarrothripus ramosana*, also a new genus, formed by the section Palpanæ of Tortrix in Mr. Haworth's *Lepidoptera Britannica*, and of which the present species is new to English Entomology. 4. *Xyela pusilla*, a singular and little known genus of Xiphydriadæ, which evidently connects the families of Tenthredinidæ and Uroceridæ, to which latter it was indeed referred by Dalman, who first described it in the *Stockholm Transactions*. It is well characterized by the extreme length of the third joint of the antennæ, which is equal to that of the nine following ones.

The eighth number contains, 1. *Buprestis nitidula*, a beautiful little species of this splendid genus, recently captured for the first time in this country by Mr. Curtis ; 2. *Hydrometra stagnorum* ; 3. *Bupalus favillacearius*, ♂ and ♀ ; and, 4. *Milesia speciosa*.

The ninth number comprises, 1. *Cryptocephalus bipustulatus*, a single specimen of which exists in the cabinet of Mr. Dale ; 2. *Lithosia muscerda*, captured by Mr. Sparshall ; 3. *Raphidia Ophiopsis* ; and 4. *Hedycrum ardens*, a rare and very splendid insect.

The insects figured in the tenth number are, 1. *Thymalus limbatus*; 2. *Sesia bombyliiformis*; 3. *Cimbex decem-maculata*, unique in the cabinet of the British Museum; and, 4. *Pachygaster Leachii*, a new species of a genus which presents an example of the confusion existing in the nomenclature of Entomology. The generic name *Pachygaster* was applied by Meigen to an insect congenerous with the present in 1804, while that of Vappo, which has been more generally adopted in England, was not given by Fabricius until the succeeding year. The original name must therefore be retained for the present genus, and a new one be applied to that portion of the *Curculionidæ* to which Germar has affixed that of *Pachygaster*. *P. Leachii* differs from the more common *P. ater* by its wings, which are entirely transparent.

The eleventh number contains, 1. *Scolytus destructor*, a common, and, as its name imports, destructive insect, which is unfortunately becoming much too frequent in the vicinity of London, committing devastations among the trees, especially in St. James's and Hyde Parks, to so great an extent as to have recently called forth from the pen of Mr. W. S. MacLeay an excellent paper on its natural history, and on the means of checking the mischief it is producing. 2. *Clerus alvearius*, extremely rare as British; 3. *Cucullia Asteris*, with its larva; 4. *Asilus Germanicus*, two specimens of which are contained in the British Museum.

The twelfth number, which completes the first year of publication, includes, 1. *Pogonus Burrellii*, an entirely new species of a maritime genus of *Carabidæ* which has been more frequently termed *Raptor* in the English cabinets; 2. *Pontia Daplidice*, figured from the only British specimen now known, captured by and in the possession of Mr. Stephens, but which appears to have been of more frequent occurrence in the times of Ray and Petiver; 3. *Trichiosoma laterale*; and, 4. *Limnobia ocellaris*, a rare and beautifully marked species.

We cannot conclude this notice without expressing our pleasure at the prospect which the conclusion of the first volume of this very important and valuable publication affords of its continuance. The list of subscribers appended to it, and the knowledge we possess of a considerable sale in other quarters, induce us to anticipate a

fair remuneration for the labours of its authour, which can only be justly appreciated by those who have been engaged in similar pursuits. He will thus, we trust, be enabled to persevere in the arduous undertaking which he has commenced, and which we heartily wish him health and time to conclude. A work thus excellently conducted will, if completed, form a distinguishing feature of British Entomology, and offer even to foreigners a compendium of science and accuracy with which no other publication on the subject can at all compete.

The Mineral Conchology of Great Britain; or coloured figures and descriptions of those remains of testaceous animals or shells, &c. By James D C. Sowerby, F.L.S., &c. Nos. 81, 82, 83.

AMONG the numerous interesting fossils figured in these numbers, the genus *Bellerophon* of De Montfort deserves particular mention. Of these singular shells, which differ chiefly from the *Nautili* by the absence of septa, figures and descriptions are given, in Number 81, of no less than five species, which are readily divisible into two sections, the first without, the second with, a central band; the two species referable to the first of these sections, *B. apertus* and *B. Cornu Arietis*, being entirely new. Seven new species of *Pectunculus*, six of *Arca*, and nine of *Nucula*, form a considerable addition to the previously received information on this family; and a very pretty plate of *Buccina* offers to our notice three new species from the Suffolk Crag, presented by the zealous oryctologist, whose name is commemorated in the *Ovula Leathesi*, the subject of the succeeding figures. A very curious species of *Natica*, *N. Sigaretina*, from the marl of the London clay, and two other species of this genus, are given, with a magnificent specimen of *N. glaucinoides*, in the next plate, which is followed by the remarkable *Clavagella coronata*. Three new species of *Nautilus* from the Black Rock, Cork, three of *Patella*, and a fossil *Fissurella græca*, from the Suffolk Crag, are contained in the 83d Number; which concludes with a

figure of the bivalve covering of an animal of the genus *Cypris*. This, though it does not strictly come within the province of the Conchologist, is very appropriately introduced, since it is frequently of considerable importance as a distinguishing mark of particular strata.

The Genera of Recent and Fossil Shells, for the use of Students in Conchology and Geology. By G. B. Sowerby, F.L.S. With original plates, by J. D. C. Sowerby, F.L.S. Number xxiv.

Of this work there has appeared since our last notice only one number, which contains *Oniscia* N. G., *Pyramidella*, *Pyrula*, *Mactra*, *Lutraria*, and *Tornatella*, together with the plate illustrative of the Genus *Pholas*. *Oniscia*, a genus established by Mr. Sowerby, to receive the *Strombus Oniscus* of Linnæus and other congeneric shells, is thus characterized: “*Testa oblonga, subcylindrica, apice obtusiuscula, basi acuminata: Spirâ brevi; aperturâ elongatâ, basi in canalem brevissimum desinente; labio externo subincrassato, internè denticulato, medianè subcoarctato, interno expanso, granulato:*” and the species referred to it are the *O. oniscus*, which was very unaptly arranged among the *Cassidariæ* by Lamarck; the *O. cancellata*, an elegant and extremely rare species, “*superficie externâ lineis elevatis, cancellatis,*” now first described and figured; the *O. tuberculosa*, a new species just received from the South Seas; and the *O. Cythara*, a fossil from Italy, the *Buccinum Cythara* of Brocchi. The characters of the genus *Pyramidella* are so enlarged as to admit the *Helix polita*, *Mont.*, and several similar shells, which differ from the *Pyramidella* of Lamarck chiefly by the absence of the plaits on the columella; while those of *Pyrula* are contracted to confine this genus to *P. ficus* and the similar species known in commerce by the name of *figs*. The remaining genera correspond with those of Lamarck, the only alteration of importance introduced being in the description of the lateral teeth of *Mactra*, which are stated by that distinguished Conchologist

to be two on each side of the hinge in both valves. This is certainly correct with respect to one valve, but the other possesses only a single tooth on each side of the hinge, as justly pointed out by Mr. Sowerby.

Monographies de Mammalogie, ou descriptions de quelques genres de Mammiferes dont les especes ont été observées dans les differens Musées de l'Europe. Par J. C. Temminck. Livraisons 1-3. pp. 72. pl. viii.

M. Temminck, whose labours in Ornithology are so justly esteemed by the students of that extensive department of Zoology for their extreme accuracy and precision, has just entered on the elucidation of another class of the vertebrated animals, in which he will have ample opportunities for the display of those talents evinced by his former publications. In his various visits to the different collections of Europe, which were chiefly devoted to the investigation of the subjects connected with his favourite study, the observations of this industrious naturalist were, however, by no means confined to this limited range, but also embraced in its widest extent the history of the Mammalia. The numerous errors and almost interminable confusion existing in the previous nomenclatures of this, the highest range of animal productions, appear to have made a strong impression on his mind, and to disperse and correct them, he determined on the publication of a series of Monographs on the Mammalia, the first fruits of which we have now to announce.

The genera comprehended in the three *livraisons* which have hitherto appeared, are Phalangista, Didelphis, and Dasyurus. On each of these, particularly on the latter, the observations of M. Temminck are most important and satisfactory. Correcting the character of Phalangista, from which he excludes the flying species, by the substitution of six incisors of the upper jaw in lieu of eight, as stated by Geoffroy and Illiger, he divides the species into two sections, the first of which has the tail almost entirely covered with hair and the ears long, and the second has these

short, and the greater part of the tail naked and rugose. To the first section are assigned the *P. vulpina*, and *P. Cookii* of Cuvier, and the *P. nana* of Geoffroy, which is described from the specimen existing in the Museum of Paris; the second comprising the various species included in the *Didelphis orientalis* of Linnæus. These are the *P. ursina* and *P. chrysorrhos*, now first described, the *P. maculata* of Geoffroy, and the *P. cavifrons*, which includes the *Phalanger blanc* and the *P. roux* of the same author.

The genus *Didelphis*, the animals of which are well known as possessing a greater number of teeth than has yet been observed in any other group of the Mammalia, is also distinguished into two sections, the females of the first possessing a marsupium, which is wanting in those of the second, where it is replaced by a mere duplicature of the ventral skin. The first of these contains *D. virginiana*, *D. Azara*, *D. cancrivora*, *D. Quica*, *D. myosurus*, apparently new, *D. Opossum*, and *D. Philander* of Schreber; and the second, *D. cinerea*, a new species discovered in Brazil by the Prince de Neuwied, *D. dorsigera*, *D. murina*, *D. tricolor*, and *D. brachyura*. The synonymy of these species, which has hitherto been extremely confused, has been unravelled by M. Temminck with his usual sagacity and assiduity.

The species of *Dasyurus*, Geoff., which form the subject of the succeeding Monograph, have been well separated by M. Temminck into three genera, two of these possessing seven molar teeth in each jaw, while the true *Dasyuri* have only six. The most striking distinction between the two genera thus removed is, that the middle incisors in each jaw are very large, compared with the lateral ones, in *Phascogale*, while in *Thylacinus* they are of equal size with the others. To *Phascogale*, M. Temminck consequently refers the *D. penicillatus* and *D. minimus* of Geoffroy; and to *Thylacinus*, the *Didelphis cynocephalus* of Harris Lin. Tr., which since the examination of the Cranium in the possession of Mr. Brookes, and the specimen in the Museum of the Linnean Society, we had strongly suspected as constituting a distinct genus. The *D. ursinus*, *D. macrourus*, *D. Maugei*, and *D. viverinus*, are the species arranged as *Dasyuri*; *D. taffa*, Geoff. not

having yet been sufficiently examined to ascertain precisely its location.

The illustrations comprise figures of the Osteology of several of the species described, and of numerous Crania, which are executed in a very superior manner to some which have recently appeared.

Annales des Sciences Naturelles. Nos. vi.—x.

THE series of this new periodical which we have now to notice, comprises some of the most important papers on abstruse points of Physiology and minute Anatomy, which have of late years been given to the world. Of this Class are the Researches of MM. Prevost and Dumas relative to the generation of animals, which, illustrated as they are with a considerable number of new facts collected with the most indefatigable perseverance and arranged in a manner to elucidate their various bearings, form altogether an admirable production, and one which is calculated beyond any other that has hitherto appeared to remove some portion of the mystery in which this arcanum of nature is enveloped. This paper, continuations of which are given in two of the present numbers, is worthy the perusal of the philosophic Zoologist, whose attention it cannot fail to arrest, and to whom it will prove a source of increasing attraction, corresponding with the importance and difficulty of the subject which it is designed to elucidate. Of considerable value are also the Papers on the internal anatomy of certain insects, by M. Leon Dufour, the present series of which is devoted to the digestive organs of the Coleoptera, numerous specimens of each of the pentamerous families, and more especially of the Carabidæ, having been examined and figured by that acute observer with the greatest care.

The discovery in the course of the last year, by M. Mielzinsky, of the larva of a Coleopterous insect which fed on snails, and from which he bred an apterous female referable, as he conceived, to a new genus established to receive it under the name of *Cochleoc-tonus*, has led to some interesting results, which are detailed in the publication under our notice. By this discovery, the attention of

the Parisian Entomologists appears to have been strongly excited, and M. Desmarest in particular applied himself to the investigation of this curious subject with a success that rewarded his exertions, by the certainty that the insect in question was in fact the female of *Drilus flavescens*. The details of his enquiries and experiments form a very interesting article ; and our knowledge of this insect is rendered yet more complete by a subsequent memoir from M. Audouin on its anatomy, as a supplement to which he describes from the cabinet of M. Dejean two new species of this genus, *D. ater*, which is black throughout, and *D. fulvicollis*, black, with the thorax, antennæ, and feet fulvous. By these investigations, the history of this insect, whose female even was previously unknown, is now rendered more complete than that of perhaps any other of the Coleoptera. A notice from the latter gentleman, also points out the existence of an additional species of *Achlysia* to that described and figured in the Zoological Journal, (p. 122, and pl. iv. ff. 2—7.) His new species he terms *A. Mannerheimi*, white, with four rows of red spots on the back. A new genus of Araneidæ, *Myrmecium*, from Rio Janeiro, which forms the passage from the *Dolomedes* to the *Eresi*, is described by M. Latreille ; and a new *Coccus*, *C. Zææ Mays*, by Leon Dufour. A description and figures of the *Fasciola Lucii*, by M. Jurine, and the translation of Mr. Bauer's admirable Croonian Lecture on the *Vibrio Triticæ*, illustrated with copies of his drawings, also merit particular attention.

In the vertebrated department of Zoology, next in importance to the researches of MM. Prevost and Dumas mentioned above, is an article from the pen of Geoffroy St. Hilaire, on the composition of the Cranium, which he deduces from the union of seven vertebræ, forming a continuation of the rachis of the spine ; regarding the lower jaw as an additional unattached vertebra. This article is obviously incapable of being condensed into the small compass which we could allot to it ; neither can we do more than refer to the papers by M. Majendie, on the functions of several of the nerves, particularly of the olfactory, which he appears to have proved to be by no means essential to the sense of smell. The title of the Geological notice, by M. Huot, "on the pretended

human fossil," discovered near Moret, sufficiently indicates his opinions on this contested subject, which appear to coincide with those of the best informed observers. The Memoir on the use of the horns in certain animals, and particularly in the Buffalo, by Dr. Bailly, is extremely curious; as is also his description of the fishing filaments of the *Lophius piscatorius*, a report on which by Geoffroy St. Hilaire, well merits the attention of the reader.*

From this too rapid enumeration of the Zoological contents of five numbers of the *Annales des Sciences Naturelles*, it will be perceived that much valuable information is to be derived from them; and it appears highly probable, that should the Editors persevere in the spirited course which they have commenced, their publication will obtain a deservedly extensive circulation, and render the most important services to the advancement of Natural History.

*Memoires de la Societé Linnéenne du Calvados. Année 1824.
pp. lxxii and 300 : planches x.*

IN the first number of our Journal it fell to our lot to announce to our readers, and we expressed the pleasure we felt in so doing, the formation of a new association for the study of Natural History, at Caen in Normandy, under the title of "La Societé Linnéenne du Calvados." On that occasion we anticipated the benefits which must result from such a Society, if conducted on liberal principles, and supported by Naturalists zealously devoted to the advancement of their favourite science. These anticipations have not been deceived; the society has hastened to secure for itself a station in the scientific world, by the publication of a volume of Transactions, destined to record at once its labours and its claims on public attention. That these are considerable may be gathered from the report of its proceedings prior to the 24th May last, in which many papers are mentioned as having been read before the Society, which do not appear in its Transactions, although from the known abilities of several of their authors, M. Lamouroux for example, they would doubtless have merited a place among the

* See p. 422 of this Journal.

memoirs of any scientific Society now in existence. It is reasonable to expect that these will appear in subsequent publications, and will consequently fall under our notice at some future period ; at present it is necessary to confine ourselves to such of those included in the present volume as fall within our immediate province.

The first of these consists of observations by M. F. de la Fresnaye on the mobility of the spots observed on the skins of the *Loligo subulata* and the *L. Sepiola*. These had already been cursorily noticed by Cuvier in his description of the *Octopus vulgaris*, Lam. but the fact as recorded by him is unaccompanied with the detail which characterizes the present memoir. The colour of the living specimens under examination varied considerably, passing alternately from a lively rose-colour to a yellowish white. On a more close observation, the rosy hue was discovered to result from numerous reddish spots with which the animal was covered, particularly about the upper part of the mantle, and which were of very different sizes, varying from a line in diameter to a mere point. The disappearance of these spots occasioned a loss of colour, which was however constantly reproduced in the same situation, the centre of each being formed by a very minute point, which was nearly black when the surrounding colour vanished, and the spreading of which under the skin produced again the rosy efflorescence. If the fluid which was thus expanded could have been proved to be red blood, the fact would have been peculiarly important to the Zoologist, as furnishing additional evidence of the *Sepiæ* forming the osculant group between the *Vertebrata* and *Invertebrata*, or in other words, between the animals with red, and those with white, blood. This fact it was however impossible to determine, the heart and branchiæ being found on dissection to be entirely white ; but it is one the investigation of which we would strongly recommend to the attention of the observing naturalist. The extreme tenuity of skin in animals of this family may facilitate the partial oxygenation of the blood, and the alternate colouration and discolouration of the spots may thus possibly be owing to a healthy action, and not to the emotion of fear to which they are attributed by M. de la Fresnaye.

The extract from a memoir of M. Blot on the properties of the Insects found in the vicinity of Caen, contains many curious, and some new, facts, relative to the damage occasioned by these minute yet powerful agents in the economy of nature. In some points the remarks of the authour would have been more valuable had he been possessed of more extensive information. Thus he regrets that Ants have never yet been looked to as furnishing an instrument in the hands of the Physician; surely M. Blot cannot have failed to have met with, in common with almost every reader, the *Aqua Magnanimitatis* of the older writers on medicine. This is not however the place to enter into any details on the subject of the present article, and we shall therefore pass on to the succeeding one, a memoir by M. E. Deslonchamps on the shells of the genus *Gervillia*.

In the character of this genus as given by M. Defrance, (to whom we are indebted for the first notice of it, which he deduced from the cast of a single species, *G. solenoides*,) M. Deslonchamps proposes several modifications, which enable it to receive four other shells which appear to be intimately connected with it. These are the *G. pernoides*, (*Perna aviculoides*, Sow. Min. Conch. t. 66,) *G. siliqua*, *G. monotis*, and *G. costatula*, all of which are figured and described. In opposition to the opinion of M. Defrance, the author of this memoir conceives that *Gervillia* has no opening for the passage of a Byssus. Should this prove to be the case, which we are rather inclined to doubt, it will effectually separate the shells of this, from those of the other genera of *Malleaceæ*. Their nearest affinity is with those of *Perna*, from which they may at once be distinguished by possessing an apparently inner additional hinge, formed of several oblique teeth variously disposed according to the species.

The observations by M. Gaillon on the cause of the colouring of Oysters and on the animalcula by which they are nourished, are a continuation of the enquiries previously instituted by that gentleman, some of the results of which had already appeared. According to his observations, several of the Infusoria possess the power of uniting themselves to form filaments, which have been frequently confounded with Byssi and *Confervæ*, and in this state

it has been assumed that they furnished nutriment to the Oyster, which, while feeding on this apparently vegetable matter, acquired the green colour that is occasionally remarked in those that are supplied from the reservoirs in which they are preserved to fatten. This opinion is controverted by M. Gaillon, whose observations tend to show that in their aggregated state these animalcula are incapable of being taken in by the nutritive organs of the oyster, which are only adapted to imbibe them in their separate form. In this state they furnish the most advantageous nutriment; the oyster becoming fat and tender, and acquiring a peculiarly agreeable flavour. This portion of the enquiry may however seem fitted rather for the pages of the *Almanach des Gourmands* than for ours, and we shall therefore merely mention that, in addition to the green *Navicula* (*Vibrio navicularis* Auct.) which furnishes this excellent food, various species of this and other genera of Infusoria are referred to as beneficial to the oyster, while some are described as injurious to it. The paper is indeed full of curious matter, and is well deserving of attention.

The last article to which it is necessary to refer is one by M. de Basoches on a Fossil Shell, which he names *Melania Lafresnayi*. It is of considerable size, and approaches more nearly to the *M. striata* of Sowerby's *Mineral Conchology*, than to any other published species. Casts of it are not uncommon at Fresnay, but only a single mutilated specimen of the shell, of which a figure is given, has yet been discovered.

ART. LXX. *Proceedings of Learned Societies on subjects connected with Zoology.*

ROYAL SOCIETY.

The meetings of this learned body were resumed on the 18th of November 1824; when the following papers were read:

The Croonian Lecture; by Sir E. Home, Bart. M.D. V.P.R.S. In this Lecture Sir Everard announced his discovery of nerves on the fetal and maternal surfaces of the placenta.

His previous researches had led him to doubt the existence of blood-vessels without nerves, and the extreme vascularity of the placenta led him to suspect them in that organ. With the assistance of Mr. Bauer, therefore, he first examined the placenta of the Seal, the arteries and veins of which had been injected, and in which nerves were discerned, not only surrounding the umbilical arteries, but also in the uterine portion.

In the pregnant uterus of the Tapir of Sumatra, in which, there being no placenta, the umbilical cord is connected with the chorion; nerves were very conspicuous in the transparent portion of the chorion, along which the branches of the funis pass before they arrive at the spongy part.

Having thus proved the existence of nerves in the placenta, and where that is wanting, in the flocculent chorion, Sir E. proceeded to offer some general remarks upon their probable uses and influences. From the various sources, the number and the ganglia of the uterine nerves, and from the circumstance of their becoming enlarged during pregnancy, he inferred their powerful influences on the *Fœtus in Utero*; and, for the further illustration of this subject, added a description of the nerves connected with the generative organs in the Human Species, the Quadruped, the Bird, and the Frog.

He concluded the lecture with remarking, that since the discovery of the placental nerves proves the existence of a communication through their medium between the brain of the child and that of the mother, some light may be thrown upon the degree of dependence in which the fœtus is kept, during the whole time of utero-gestation, and upon the influence of the bodily and mental affections of the mother upon the child; in further illustration of which, several instances were detailed in proof of the descent of various peculiarities of the mother to the offspring.

Observations on the Changes the Ovum of the Frog undergoes during the formation of the Tadpole; by the same author.—The ova of the Frog when in the ovaria, consist of dark vesicles, which acquire a gelatinous covering on entering the oviduct, and are completely formed by the time they reach the cavities in which the oviducts terminate, and during their expulsion from

which they receive the male influence; after this the contents of the ovum, previously fluid, coagulate and expand, the central part being converted into brain and spinal marrow, while in the darker substance of the egg, the heart and other viscera are formed.

The membrane forming the vesicles, being destined to contain the embryo when it has become a tadpole, enlarges as the embryo increases, and may be said to perform the office both of the shell and its lining membrane in the Pullet's egg, serving as defence, and allowing of aëration.

The black matter which lines the vesicles, probably tends to the defence of the young animals from the too powerful influence of the solar rays, frog-spawn being usually deposited in exposed situations. Sir Everard observed, that in the Aquatic Salamander, an animal whose mode of breeding closely resembles that of the Frog, this nigrum pigmentum is wanting; but that that animal deposits its eggs within the twisted leaves of water-plants, which afford them an equivalent protection.

November 30.—This being St. Andrew's Day, the Anniversary Meeting of the Society was held, at which the Council and Officers for the ensuing year were elected, as follows:—

Of the Old Council.—Sir Humphry Davy, Bart.; W. T. Brande, Esq.; Samuel Goodenough, Lord Bishop of Carlisle; Major Thomas Colby; John Wilson Croker, Esq.; Davies Gilbert, Esq.; Charles Hatchett, Esq.; Sir Everard Home, Bart.; John Pond, Esq.; William Hyde Wollaston, M. D.; and Thomas Young, M. D.

Of the New Council.—William Babington, M. D.; Francis Baily, Esq.; John George Children, Esq.; John William, Viscount Dudley and Ward; John Frederick William Herschel, Esq.; Captain Henry Kater; Thomas Andrew Knight, Esq.; Alexander MacLeay, Esq.; Sir Thomas Stamford Raffles, Knt.; and Edward Adolphus, Duke of Somerset.

President—Sir Humphry Davy, Bart. *Treasurer*—Davies Gilbert, Esq. *Secretaries*—W. T. Brande, Esq. and J. F. W. Herschel, Esq.

LINNEAN SOCIETY.

THE sittings of the Linnean Society were resumed on the 2nd of November, 1824, when the following papers on Zoological subjects were read.—

A letter from Mr. J. D C. Sowerby, F.L.S. to Mr. R. Taylor, F.L.S., stating that many specimens of a fresh-water shell, the *Mytilus polymorphus* of Gmelin, which is a native of the Danube, had been found in the Commercial Docks, in the Thames, where the species had probably been brought in timber.

A Description of three species of British Birds; two of them new to the Ornithology of the British Islands. By N. A. Vigors, Jun. Esq. F.L.S: communicated by the Zoological Club.

Nov. 16.—A letter was read from John Atkinson, Esq. F.L.S. to Alexander MacLeay, Esq. Sec. L. S., accompanying specimens of a Beetle, found in a Mummy sent from Egypt by Mr. Salt, and recently opened for the Museum of the Leeds' Philosophical Society. The imperfection of the embalming appeared to indicate that the person had not been of high caste: the folds of the linen in which the mummy was wrapped contained several hundreds of the larvæ of the Beetle, and some of the perfect insects.

Descriptions of several species hitherto unpublished, of the Genus *Coccinella*; by George Milne, Esq. F.L.S.: communicated by the Zoological Club.—*C. circumdata*, 4-fasciata, *ephippia*, *parva*, 6-guttata, *decussata*, *adominalis*, and *cyanea*, from Brazil: 28-maculata and 18-maculata, from New Holland; *cordata* and *connata*, from North America.

Observations on the *Motacilla Hippolais* of Linnæus; by the Rev. Revett Sheppard, M.A. F.L.S.: communicated by the Zoological Club. Mr. S. has deduced, from a particular examination of the subject, that the bird in question is the greater Pettychaps of English writers.

Dec. 21.—A letter from Mr. J. Youell, A.L.S. announcing that specimens of *Ardea Cayanensis* and the Green Ibis of Latham had been taken near Yarmouth; and correcting some erroneous statements of Bewick respecting *Fulica atra*.

A Description of such genera and species of Insects, alluded to in the Introduction to Entomology of Messrs. Kirby and Spence, as appear not to have been before sufficiently noticed or described; by the Rev. W. Kirby, F.R. & L.S.: communicated by the Zoological Club.

The Society then adjourned to Jan. 18, 1825.

ZOOLOGICAL CLUB OF THE LINNEAN SOCIETY.

September 28.—The reading of Mr. W. S. MacLeay's paper "On Tunicata; with a description of three new species," which was commenced on the 8th of June, was resumed by the author.

October 26.—The Secretary exhibited two specimens, male and female, of the *Anas glocitans*, Pennant, which had been taken in a decoy near Maldon in Essex, and sent to Leadenhall market in the winter of 1812-13. He pointed out the difference of the species from the rest of the European *Anatidæ*, and its station in that family. He subsequently read a paper entitled "Descriptions of three species of British Birds, two of them new to the Ornithology of the British Islands." In this communication were described the *Anthus Richardi*, and the *Scolopax Sabini* which were exhibited on the 13th of April, and the *Anas glocitans* exhibited this evening.

November 9.—Dr. Horsfield exhibited a specimen of a species of *Vespertilio*, Linn., from Dartmoor Forest, communicated by Dr. Leach, and which that gentleman considered new to the British Fauna. It is chiefly distinguished by a rounded head, triangular ears emarginate behind, and a greatly lengthened tail; the colour being brown above, and yellowish below. In these characters it resembles the *V. pipistrellus* of the continental authors; but as the teeth of the specimen before the Club were not perfect, Dr. Horsfield stated that further comparisons are required to ascertain whether it is referable to that species, or altogether new. The length of the body is 1 in. $\frac{4}{3}$, and the expansion of the wings five inches.*

The reading of the Translation of M. Chabrier's paper "On the Flight of Insects," was resumed by Mr. Bennett.

* See p. 559 of this Journal.

November 23.—The Secretary exhibited a specimen of the *Scolopax Sabini*, the new species which had been laid before the Club on the 13th of April, and the description of which had been read at the Meeting of the 26th of October. The specimen before the Club was the property of W. A. Dunning, Esq. of Maidstone, and was shot on the 26th of October 1824, on the banks of the Medway, near Rochester. This is the second instance of the species having been met with in the British Islands.

The reading of Mr. W. S. MacLeay's paper "On Tunicata," was concluded.

A discussion, in which several members of the Club took a part, subsequently ensued, on the subject of the quinary arrangement and the circular succession and affinities among the groups of Nature; an allusion to which had been made in the foregoing paper. In the course of this discussion Mr. Vigors took the opportunity of stating a fact which had come to his knowledge in the course of the preceding morning, and which was strongly corroborative of an affinity which he had sometime since ventured to point out to the Club, as existing between the Linnean genera *Ramphastos* and *Buceros*, and carried on through the latter group to the more typical and omnivorous families of the *Insessores*. He had seen a specimen of *Ramphastos erythrorhynchus*, Gmel., now alive in this country, which shewed a decided partiality to animal food, and to preying upon weaker birds. The bird in question, soon after its arrival in this country had seized upon a stray bird that accidentally approached its cage, and instantly devoured it. It has since been occasionally supplied with birds, and other animal food, particularly eggs, for which it evinces a decided predilection. The habit of feeding on animal substances, which is conspicuous in the *Corvidæ*, and occasionally observed in the *Buceridæ*, is thus partially preserved in the *Ramphastidæ* (a group that has hitherto been considered to feed alone upon fruits and other vegetable productions,) until it gradually disappears in the *Psittacidæ*. The further discussion of the subject was postponed to a future meeting.

November 29.—ANNIVERSARY MEETING. The following members were elected to form the Council and Officers for the en-

suing year: Rev. W. Kirby, *Chairman*; J. F. Stephens, Esq. *Treasurer*; N. A. Vigors, Esq. *Secretary*; Joseph Sabine, Esq., Thomas Horsfield, M. D., E. T. Bennett, Esq., J. G. Children, Esq., J. E. Bicheno, Esq., W. S. MacLeay, Esq.

December 14.—Mr. Vigors exhibited to the meeting a series of Birds belonging to the family of *Laniadæ*; and he explained and exemplified their mutual affinities among themselves, and their connection with the conterminous families of *Merulidæ* and *Muscicapidæ*. He pointed out the typical characters of the five groups into which they had been separated by Mr. Swainson in his paper “On the *Laniadæ*,” in the 3rd Number of the *Zoological Journal*: and he entered at length into the details by which that gentleman characterized the subordinate groups of the family. In the course of his observations he exhibited some specimens of the family which had been communicated to him by Mr. Swainson for the information of the Club. Among these were the types of that gentleman’s newly formed genera *Cyclarhis*, *Malaconotus*, *Formicivora*, and *Dryophila*; as also the *Bru-bru* of M. Le Vaillant, or *Lanius Capensis* Gmel.; and the *Carinated Flycatcher* of the “*Zoological Illustrations*.” He also took the opportunity of exhibiting specimens of the following new species of *Laniadæ*, which were communicated by Mr. Such; the descriptions of which by that gentleman are published in the present number of this *Journal*: viz. *Thamnophilus Swainsonii*, *T. maculatus*, *T. Vigorsii*, ♂ and ♀, *T. Leachii*, *T. ruficeps*, *T. niger*, and *Dryophila variegata*. After having gone through the details of the *Laniadæ*, Mr. Vigors pointed out two prominent facts which became evident on the accurate examination of the group; namely, the distribution of the whole family into five subdivisions, connected with each other, but still exhibiting separate typical characters; and the circular succession by which these subdivisions returned into themselves. He thence took occasion to refer to the subject of the quinary distribution of Nature; and a discussion ensued on the subject among the members of the Club.

The Club adjourned to Tuesday the 11th of January, 1825.

GEOLOGICAL SOCIETY.

Dec. 3.—A notice was read, “On some Fossils found in the Island of Madeira;” by the late T. E. Bowdich, Esq.

In this notice, the author describes a formation of branched cylindrical tubes incased with agglutinated sand, which occur in great abundance near Fanical, 15 miles from Funchal, in the Island of Madeira. Mr. Bowdich is inclined to refer these to a vegetable origin. They are accompanied by shells, some decidedly terrestrial, and others which appear to belong to a marine genus. In conclusion, some account is given of the general features and structure of the neighbouring district.

ROYAL ACADEMY OF SCIENCES OF PARIS.

September 6, 1824.—M. Thenard announced, in a verbal report, the results of the analysis of several fragments of the fossil found at Moret, which he had made in conjunction with M. Vauquelin. M. Cuvier, on this occasion, made some remarks on the characters proper to fossil animals. After having proved that the mass of Grès found at Moret, if it really were a fossil man and horse, would not overturn the views adopted in Geology; he shewed that the true method of arriving at a certain conclusion in this case, would be to saw the piece in which the horse's head appeared through the middle; the presence or absence of teeth would then decide the question. M. G. Saint-Hilaire read a memoir, entitled, *On the Composition of the Skulls of Vertebrated Animals, principally those of Crocodiles and Birds*: (art. 1.) of the cranium, as forming part of the *rachis*, and as consisting of seven vertebra.

September 20.—M. Latreille gave a verbal report on the *Analecta Entomologica* of M. Dalman.

September 27.—M. G. Saint-Hilaire commenced the reading of a memoir, entitled, *On the Sections of the Cranium in the Crocodile, compared with the analogous bones in all animals*; restoring them, on the one hand, to philosophical identity, and considering them,

on the other, under the relations of the specific nature and the anomalies of their forms.

October 4.—M. de Saint-Hilaire concluded his memoir.

October 18.—M. Gaymard read some observations on certain Mollusca and Zoophytes considered as giving rise to the phosphorescence of the sea. M. Dumeril gave a verbal account of a Zoological and Physiological Treatise on the Intestinal Worms of the Human Body, by M. Bremser. M. G. de Saint-Hilaire presented a lithographic print, entitled, *Determination of the Sections of the Cranium in Fishes; Composition of the Skull in Man and in Animals*. To this were annexed an engraving and a manuscript note: M. de Saint-Hilaire announced that he should develop his ideas on the subject in several memoirs speedily to be published.

ART. LXXI. *Scientific Notices.*

RADIARIA:—ALECTO—COMATULA.

Dr. Leach has requested us to state that he divided the genus named by him Alecto, from Asterias, in his Zoological Miscellany, vol. ii. p. 61, in the year 1815; which was afterwards named Comatula, by Lamarck, in 1816, in his *Histoire Naturelle des Animaux sans Vertebres*, vol. ii. p. 530.

ORNITHOLOGY.

The geographical distribution of the Animal Kingdom is a subject of so much interest, that we feel much pleasure in having an opportunity of adding to our readers' information on this point, by noticing the following instances of some rare British Bird having been met with in Ireland. A specimen of the *Merops apiaster*, Linn. was killed on the sea-shore near Wexford in the winter of 1820, and is at present in the collection of James Tardy

Esq. of Ranelagh, near Dublin. Another of the *Pastor roseus*, Temm., was killed nearly on the same spot, and in the same year, and is preserved in the cabinet of N. A. Vigors, Esq. In the winter of 1822—3, a specimen of the *Bombycilla Bohemica*, Briss., was found dead in the woods of Burton Hall, in the county of Carlow, and is now in the possession of Robert C. Browne, Esq. of Browne's Hill in that county. We beg leave to add the following information on this subject, which has been extracted from a letter to one of the Conductors of this Journal, from the Rev. Wm. Bulwer, F.L.S. of Rosemount, near Dublin. "A specimen of the *Golden Oriole*, (*Oriolus galbula*, Linn.,) was shot in the county of Wexford, in May last, and is preserved in the Museum of the Dublin Society. Three specimens of *Tan-*
 7/ *talus igneus*, Gmel., were shot in September by two different individuals in the county of Longford: one is in my possession, another in the Dublin Society, and the third was received in too putrid a state to admit of being set up. November, 1824."—It is to be remarked that the coast near Wexford, where three of those birds have been met with, is the south-east point of the island, and one of the spots where these occasional visitors of our islands would most probably first land after their departure from the continent. The writer of this notice is desirous of giving a general account of the Ornithology of Ireland; and he takes this opportunity of soliciting every information which the friends of the science can afford him on the subject, through the medium of the Conductors of this Journal.

V.

MYTILUS CRENATUS, NATURALIZED IN PORTSMOUTH HARBOUR.

The following is an extract of a letter on this subject, addressed to one of the Conductors of this Journal, by Mr. C. Willcox; dated "*Dock-yard, Portsmouth, July 15, 1824.*"

"On docking H. M. Ship Wellesley at this yard, I discovered on the lead of the knee of the head and gripe, a species of *Mytilus*, which is unknown to me as a British shell, four pair of which I beg your acceptance of; they may not be worth notice from their

rarity, yet their locality may afford some discussion, and at some future period may decide dispute, as I have no doubt the same shell will be considered ultimately a British production. The ship has been shifted many times from her moorings, and consequently some of the living shells removed and deposited in different parts of the harbour, which I should expect will propagate their kind.

“The Wellesley was built at Bombay, and launched about February, 1815; and came into this harbour 3d May, 1816, since which she has never been out; making upwards of eight years at this port; and docked the 7th instant, when I collected the shells.”

The *Mytilus* above referred to appears to be the *M. crenatus* of Lamarck; the specimens are smaller than usual; and it appears probable that the species will degenerate, until at last it becomes very small, or wholly unable to exist in an uncongenial climate.

J. DC. S.

ADDITION TO MR. BRODERIP'S COMMUNICATION.

Since Mr. Broderip's remarks on the living Toucan in St. Martin's-lane went to press (see p. 484), Mr. Swainson has been in town, and has ascertained that it is the *Ramphastos erythrorynchus*, L. in a young state. It thus appears, that the rich colours of the bill in this species, are obscure and ill-defined until the bird is full grown; a fact hitherto unnoticed in their history.

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ERRATA.

- Page 49, l. 20, for *Targioni, Tozetti*, read *Targioni-Tozetti*.
 60, No. 4, to the character of *Natica patula*, add Tab. 5. f. 4.
 ib. No. 5, to the character of *Melania lævissima*, add Tab. 5. f. 5.
 61, No. 1, add 3609 after *Gmelin*; 876 after *Dillwyn, R. S.*; and 68 after *Drap. Moll.*
 62, l. 14, for *De Montford*, read *De Montfort*.
 69, l. 36, for *pelluida*, read *pellucida*.
 73, l. 29, for *Cassis Testiculum*, read *Cassis Testiculus*.
 76, l. 6, for *Knorr, t. 26*, &c. read *Knorr, i. t. 26*, &c.
 77, l. 2, for 552 read 352.
 ib. l. 4 from bottom, to *Knorr, iii. t. 2*. add f. 2.
 ib. l. 6, for *Tavanne*, read *Favanne*.
 ib. l. 8 from b. for *Gaultier. t. 16. f. 2*, read *Gaultier, t. 16, f. Q.*
 ib. l. 16, for *Knorr, vi. t. 16, f. 1*, read *Knorr, ix, t. 16, f. 1*.
 79, l. 19, for *Martini, &c. f. 317*, read 317—319.
 101, l. 9 from b. for *M. M. Merait, Guillot, &c.* read *M. M. Merat-Guillot, &c.*
 125, l. 12, for *Mr. W. H. Jenner*, read *the Rev. G. C. Jenner*.
 137, No. 6, *Icon.* for *List. Conch. 680*, read *List. Conch. 688*.
 138, l. 10, for *viii*, read *vii*.
 ib. No. 7, *Icon.* for *Ency. Method. 353*, read *Ency. Method. 352*.
 140, l. 10, for *Argenville, &c. t. 10*, read *Argenville, &c. t. 18*.
 ib. l. 12, for *b. 2*, read *c. 2*.
 ib. l. 17, for 10. *Cervina*, read *V. Cervina*.
 141, l. 20, for 11. *Cypræa Argus*, read 10. *Cypræa Argus*; and correct the other numbers.
 142, No. 12, *Icon.* for 114! read 14!
 145, l. 12, for *iii*. read *vii*.
 147, l. 7, after *Hist.* add *vii*.
 ib. l. 12, for *b. 5*, read *c. 5*.
 ib. No. 18, *Icon.* for *Gaultier, t. 30*, read *Gaultier, t. 12*.
 149, l. 5, from b. after *Hist.* add *vii*.
 151, l. 7, for *Martyn, n. c.* read *Martyn, U. C.*
 152, l. 5, for *Gaultier, &c. f. B.* read *Gaultier, &c. f. Z.*
 ib. l. 6, for *Born, t. 18*, read *t. 8*.
 l. 7, for *Ency. Method. 358*, read 355.
 l. 16, for 884, read 664.
 192, l. 10, note, for *au d*, read *aux*.
 193, l. 17, note, for *ceus*, read *ceux*.
 221, note, & 222, l. 19, for *Childrinæ*, read *Childreni*.
 241, l. 29, for *China*, read *Chili*.
 337, l. 15, for *elliptici*, read *ellipticæ*.
 l. 20, for *subclausi*, read *subclausæ*.
 411, l. 28, for *duobus*, read *duabus*.
 412, l. 21, for *Psittacula*, Kuhl, read *Psittacula*, Briss.
 l. 27, for *aureo-rubri*,—*coccinei*, *purpureo-marginati*, read *aureo-rubra*,—*coccinæ*, *purpureo-marginatæ*.
 417, l. 32, for *duobus*, read *duabus*.
 489, No. 57, for *Humphreysii*, read *Humphreyii*.
 ib. l. 9 from b. for *Mart. i. t. 29, f. 30*, read *Mart. i. t. 29, f. 303*.
 490, l. 13, & 522, l. 29, for *Humphreys*, read *Humphrey*.
 497, No. 65, *Icon.* for *Gaultier. t. 13. f. 22*, read *Gaultier, t. 13. f. QQ*.
 518, No. 91, for *Childrini*, read *Childreni*.
 ib. l. 4, for *palida costato*; *striata-linea*, read *pallida, costato-striata; lineâ, &c.*

ADDENDUM.

To *Cypræa*, Note, p. 511,—are undescribed; read *are undescribed*, and the latter I propose to call *V. Barnsii*, as Mawe has called *Voluta nucleus* of Lamarck *Voluta Harpæ*.—J. E. G.

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